

ERIOGONUM (POLYGONACEAE) OF UTAH

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At the request of Dr. Stanley L. Welsh of Brigham Young University, Provo, Utah, I have prepared a treatment of the genus *Eriogonum* (Polygonaceae) for a new addition of his book *Common Utah Plants*. As this review is for a student oriented publication and no new names or combinations can be easily published therein, I am submitting a formal paper reviewing the genus in Utah and making the necessary name changes. It is hoped too, that this publication will be of use to the more "professional" taxonomist who would like species descriptions and synonymies - a feature not included in Welsh's format. The style of presentation given here follows that used by Reveal and Munz (1968) in a review of the genus for the California flora.

Eriogonum Michx. Wild Buckwheat

Annual or perennial herbs and shrubs with basal or cauline, alternate leaves and often with alternate or whorled scale-like to foliaceous bracts, entire and estipitate; flowers perfect or imperfect, borne in campanulate to turbinate or cylindric involucre, 4-10-lobed or toothed or rarely composed of two whorls of 3 lobes, awnless, few- to many-flowered, sessile or peduncled; tepals petaloid, 6-parted in two series of 3 segments each, on a distinct pedicel or the base of the flower attenuated into a stipe-like base; stamens 9, the filaments filiform, often pilose at the base; ovary 1-celled, styles 3 with capitate stigmas; achenes mostly 3-angled or winged. A North American genus of some 240 species found mainly in the western United States. (Greek, *erion*, wool, and *gonu*, knee or joint, the type of the genus, *E. tomentosum* Michx. being hairy at the nodes.)

- A. Flowers with stipe-like bases, mostly yellow to reddish-yellow or rarely cream, glabrous or pubescent; low spreading caespitose to shrubby perennials. II. Subgenus *Oligogonum*
- AA. Flowers not attenuated into a stipe-like base.
 - B. Plants perennials.
 - C. Plants caespitose to large shrubs, not monocarpic; flowers white to yellow; stems glabrous to tomentose; achenes not winged, usually enclosed by the mature flower, brown to black. I. Subgenus *Eucycla*
 - CC. Plants tall, strict and erect, monocarpic perennials; flowers yellow; stems strigose; achenes distinctly

- winged and obviously exerted beyond the mature flower, usually yellowish. III. Subgenus *Pterogonum*
- BB. Plants annual, or if perennial, then stems inflated and flowers yellow, hirsute and in pedunculated involucre.
- C. Involucres smooth, not ribbed or angled, usually distinctly peduncled, or if sessile, then not vertically appressed to the stems; annuals or perennials. IV. Subgenus *Ganysma*
- CC. Involucres angled to strongly ribbed, usually tightly appressed to the stems and always sessile; strictly annuals. V. Subgenus *Oregonium*

I. EUCYCLA. *Plants caespitose to shrubby perennials*

- A. Plants distinct shrubs or subshrubs, woody above the caudex and not dying back completely to the ground after each year. SECTION A.
- AA. Plants herbaceous, caespitose or pulvinate perennials.
- B. Plants herbaceous; inflorescences open. SECTION B.
- BB. Plants caespitose or pulvinate; inflorescences usually, but not always, capitate. SECTION C.

Section A. *Plants shrubs or subshrubs*

- A. Flowers pubescent without, 2.5-3 mm long, white to pink; low shrubs; Washington Co. 1. *E. fasciculatum*
- AA. Flowers glabrous without.
- B. Stems smooth, glabrous to tomentose; inflorescences with involucre arranged in loose to compact terminal cymes or racemose along the straight branches, the branches never zig-zag.
- C. Inflorescences large with numerous branches and branchlets bearing racemose arranged involucre at their tips; stems and branches glabrous to floccose or rarely densely tomentose.
- D. Leaves pubescent below with dense tomentum.
- E. Leaves linear-lanceolate to oblanceolate or elliptic, 1.5-4.5 cm long; involucre sessile or if peduncled, then stems glabrous.
- F. Leaves linear-lanceolate to oblanceolate or narrowly elliptic, 1.5-4.5 cm long, 2-8 mm wide; branches floccose to glabrous; eastern Utah. 2. *E. leptocladon*
- FF. Leaves oblanceolate to elliptic, 1-2.5 (3) cm long, (5) 10-20 mm wide; branches glabrous to tomentose; western Utah.
- G. Stems and branches tomentose; involucre sessile. 3. *E. hearneyi*
- GG. Stems and branches glabrous; involucre peduncled. 4. *E. ammophilum*
- EE. Leaves rounded or nearly so, 0.5-1 cm in diameter; stems and branches tomentose; western Utah. 5. *E. nummular*

- DD. Leaves glabrous on both surfaces.
 E. Inflorescences divided 3-6 times, bright green; flowers bright yellow, 3-4 mm long; Emery Co.
 6. *E. smithii*
- EE. Inflorescences divided 10-20 times, yellowish-green; flowers pale-yellow to white, 2-3 mm long; Kane Co. 7. *E. mortonianum*
- CC. Inflorescences small and compact, cymose, with involucre dichotomously arranged even at the tips of the branches; stems usually tomentose, rarely floccose or glabrous.
- D. Leaves flat, not revolute.
- E. Leaf-blades 0.2-4 cm long.
- F. Leaf-apices sharply acute, the blades mostly narrowly elliptic or narrower, 1-8 mm wide. 13. *E. microthecum*
- FF. Leaf-apices acute to rounded, the blades oblanceolate to elliptic or orbicular, (0.5) 1-3 cm wide. 8. *E. corymbosum*
- EE. Leaf-blades 3-7 cm long.
- F. Leaf-apices rounded or nearly so, 1-3 (5) cm long. 8. *E. corymbosum*
- FF. Leaf-apices acute, usually sharply so, the blades more than 3 cm long.
- G. Stems and branches subglabrous to tomentose; involucre tomentose.
- H. Involucre 3-4 mm long.
- I. Flowers white; Bad Land Cliffs, Duchesne Co.
 9. *E. hylophilum*
- II. Flowers yellow; Duchesne and Utah cos.
 10. *E. Xduchesnense*
- HH. Involucre 2.5-3 mm long; flowers white; Carbon Co.
 11. *E. lancifolium*
- GG. Stems and branches glabrous; involucre glabrous; Uintah Co. 12. *E. saurinum*
- DD. Leaves revolute.
- E. Leaf-blades 2-6 cm long.
- F. Inflorescences open to densely cymose, not broom-like, floccose to glabrate and grayish; common. 13. *E. microthecum*
- FF. Inflorescences densely cymose and broom-like, glabrous and green; San Juan Co.
 14. *E. leptophyllum*
- EE. Leaf-blades 0.5-2 cm long.
- F. Low subshrubs 1-2 dm high; southern San Juan Co. 15. *E. clavellatum*
- FF. Low matted subshrubs less than 1 dm high; eastern Utah. 16. *E. bicolor*

- BB. Stems angled or ribbed, or if smooth then obviously scabrous, or if smooth and tomentose, then inflorescence of zig-zag branches; Washington Co.
- C. Stems and branches angled and ribbed or smooth and scabrous; involucre 0.7-1.5 mm long. 17. *E. heermannii*
- CC. Stems and branches tomentose; involucre 2-2.5 mm long. 18. *E. plumatella*

Section B. *Plants herbaceous perennials*

- A. Involucre not arranged racemously along elongated branches.
- B. Stems and branches pubescent.
- C. Plants tall, more than 1 dm high.
- D. Inflorescences umbellate to cymose, or if capitate then leaves revolute and more than 5 cm long.
- E. Leaves linear and revolute or narrowly oblanceolate to narrowly elliptic; inflorescences capitate to umbellate, or if cymose, then plants 1-1.5 dm high and of north-central Utah; northern Utah. 19. *E. brevicaulis*
- EE. Leaves lanceolate to elliptic; inflorescences cymose; plants 1.5-4 dm high; south-central Utah. 20. *E. spathulatum*
- DD. Inflorescences capitate; leaves oblanceolate to narrowly elliptic; Cache Valley. 21. *E. loganum*
- CC. Plants less than 1 dm high.
- D. Stems densely tomentose; inflorescences capitate to umbellate; leaves 3-7 cm long; northern and northeastern Utah. 19. *E. brevicaulis*
- DD. Stems glabrous or slightly floccose, green; inflorescences cymose; Grand and Garfield cos. 22. *E. contortum*
- BB. Stems and branches glabrous.
- C. Leaves linear to narrowly lanceolate or oblanceolate, not broadly elliptic, spatulate or rotund.
- D. Leaves 3-10 cm long, linear to narrowly oblanceolate; stems 1-2.5 dm long, pale-green; involucre 2-4 mm long; flowers yellow; inflorescences cymose and open; northern and northeastern Utah. 19. *E. brevicaulis*
- DD. Leaves 1-5 cm long, linear and tightly revolute or lanceolate to oblanceolate and flat; eastern and southern Utah.
- E. Leaves revolute, linear.
- F. Plants 5-8 (10) cm high; stems floccose; branches floccose to glabrous; Grand and Garfield cos. 22. *E. contortum*
- FF. Plants 1-3.5 dm high; stems and branches glabrous and bright green; leaves 1-4 cm long; involucre 2-3 mm long; inflorescences

- densely cymose; flowers yellow; Uinta Basin.
 23. *E. viridulum*
- EE. Leaves flat, lanceolate to oblanceolate, 1-5
 cm long; flowers white to pale-yellow.
- F. Inflorescences narrowly cymose, 1.5-2.5 dm
 long, pale-green; leaves lanceolate, 1.5-2.5
 cm long; flowers cream to pale-yellow, 2-2.5
 mm long; eastern Uintah Co.
 24. *E. ephedroides*
- FF. Inflorescences open and spreading, usually
 grayish or reddish; flowers white.
- G. Leaves 1.5-3 cm long, 2-5 (7) mm wide,
 oblanceolate, on petioles 5-10 mm long;
 involucre solitary; flowers 3-3.5 mm
 long; San Juan Co. 25. *E. humivagans*
- GG. Leaves (2) 3-5 cm long, 2-4 mm wide,
 lanceolate, on petioles 1-2 cm long;
 involucre clustered; flowers 2-3 mm
 long; Grand Co. 26. *E. intermontanum*
- CC. Leaves broadly elliptic to spatulate or rotund, or if
 merely elliptic, then plants of southwestern Utah.
- D. Leaves elliptic to spatulate, densely white-tomen-
 tose below, floccose to glabrous and green above,
 or if tomentose on both surfaces, then plants of
 eastern Utah.
- E. Stems and branches bright green; leaves (2) 3-5
 cm long, 8-15 mm wide, tomentose below, green
 and glabrous above; flowers yellow or white;
 Kane and Washington cos. 27. *E. thompsonae*
- EE. Stems and branches grayish.
- F. Involucre not clustered; central and north-
 central Utah.
- G. Leaves crenulate; involucre 3-4 mm
 long; San Pete Co. northward to Davis
 Co. along the Wasatch front.
 19. *E. brevicaulis*
- GG. Leaves not crenulate; involucre 2-2.5
 mm long; Piute and Sevier cos.
 28. *E. ostlundii*
- FF. Involucre clustered, rarely solitary; east-
 ern Utah.
- G. Leaves not crenulate, the leaf-blade
 (1.5) 2-4 cm long; plants 2-4 dm high,
 compact; Uintah and Duchesne cos. south-
 ward to Garfield Co. 30. *E. batemanii*
- GG. Leaves crenulate, the leaf-blade 0.5-2
 cm long; plants 0.7-2 dm high, spread-
 ing; Henry Mountains, Garfield Co.
 31. *E. cronquistii*
- DD. Leaves nearly rotund to ovate, densely tomentose on
 both surfaces.

- E. Stems and branches glabrous; clay hills and flats, Millard Co. 29. *E. eremicum*
 EE. Stems and branches tomentose; sandy hills, Tooele and Juab cos. 5. *E. nummular*
 AA. Involucres racemously arranged along elongated branches.
 B. Stems tomentose to floccose; common. 32. *E. racemosum*
 BB. Stems glabrous; Zion National Park. 33. *E. zionis*

Section C. *Plants caespitose to pulvinate*

- A. Involucres ebracteate, the bracts (1) 3-5 mm below the base of the involucre; leaves linear-oblongate to narrowly elliptic, 5-15 mm long, 1-3 mm wide; flowers white, 2.5-4 mm long, the tepals dimorphic; eastern Utah. 16. *E. bicolor*
 AA. Involucres bracteate, the bracts immediately below the involucre, or if ebracteate, then flowers pilose.
 B. Tepals homomorphic, glabrous or pubescent.
 C. Flowers glabrous without.
 D. Plants 1.5-3 dm high; leaves oblanceolate to narrowly elliptic, 2-5 (7) cm long, 3-7 mm wide; flowers white or yellow; low spreading mats, Cache Valley. 21. *E. loganum*
 DD. Plants less than 1.5 dm high, or if taller, then leaves not as above.
 E. Flowers yellow or pale-yellow, or if whitish, then plants of northern Utah.
 F. Stems glabrous to floccose; leaves plane and usually crenulate.
 G. Flowers bright yellow, 1.5-2.5 mm long; stems floccose to glabrous; Wasatch Mountains from Mt. Nebo northward to southern Box Elder Co. 34. *E. grayi*
 GG. Flowers greenish-white to pale-yellow, 2-3 mm long; stems glabrous; Willard Peak, Box Elder Co. 35. *E. nanum*
 FF. Stems densely tomentose, or if floccose or even glabrous, then leaves usually revolute and plane, or if flat, then margins not crenulate and such plants of the Wasatch Plateau.
 G. Leaves plane and flat, elliptic to broadly elliptic, 1-2.5 cm long, (3) 5-8 mm wide, tomentose on both surfaces; stems densely tomentose; western Box Elder and Tooele cos. 36. *E. desertorum*
 GG. Leaves revolute, infrequently flat, linear to narrowly oblanceolate, 2.5-5 cm long, 1.5-3 (5) mm wide, tomentose below, floccose to glabrous above; stems usually tomentose to glabrous

- on the Wasatch Plateau; desert ranges and mountains of central and northern Utah. 19. *E. brevicaulis*
- EE. Flowers white; stems glabrous; mountains of Sevier Co. southward to Kane and Washington cos. 37. *E. panglicense*
- CC. Flowers pilose without.
- D. Ovaries and achenes glabrous.
- E. Flowers white, becoming rustic to rose or red in age, 3-4.5 mm long; involucre 6-8 lobed with 5-12 flowers.
- F. Plants loosely caespitose with 10-20 rosettes; stems 2-8 cm long, prostrate; inflorescences cymose-umbellate; western and south-central Utah. 38. *E. villiflorum*
- FF. Plants densely pulvinate and forming hemispheric cushions of several hundred rosettes; stems 1-9 mm long, erect; inflorescences capitate; northeastern Utah. 39. *E. tumulosum*
- EE. Flowers yellow, 1.8-2.3 mm long; involucre 4-lobed with 2-4 flowers; stems lacking; rare endemic, Garfield Co. 40. *E. aretioides*
- DD. Ovaries and achenes pubescent; flowers white or yellow, 2.5-4 mm long; common on the deserts of western and southeastern Utah. 41. *E. shockleyi*
- BB. Tepals dimorphic, the outer whorl distinctly wider than the inner whorl, or if only slightly dimorphic, then plants with oval to rotund leaf-blades 2-8 mm long and wide and restricted to the high mountains of northwestern Utah; a highly variable species found throughout the state in numerous habitats. 42. *E. ovalifolium*

II. OLIGOGONUM. *Perennial plants with stipitate flowers*

- A. Flowers glabrous without.
- B. Stems without a whorl of bracts about the middle; common throughout the state. 43. *E. umbellatum*
- BB. Stems with a whorl of bracts about the middle; common in northern Utah. 44. *E. heracleoides*
- AA. Flowers pubescent without.
- B. Stems ebracteate and scapose; inflorescences capitate; low desert ranges of western Utah. 45. *E. caespitosum*
- BB. Stems bracteate and not scapose; inflorescences mostly divided; southwestern and eastern Utah. 46. *E. jamesii*

III. PTEROGONUM. *Tall monocarpic plants with winged fruits*

- Only a single species; southern and eastern Utah. 47. *E. alatum*

IV. GANYSMSA. *Mostly annual plants with smooth involucre*

- A. Leaves glabrous, pilose, hispid or villous on one or both surfaces.
- B. Flowers pubescent without with pilose to hirsute hairs, yellow.
- C. Involucres with distinct tubes.
- D. Plants glabrous, or if glandular, the glands small and infrequent, restricted to the base of the stem.
- E. Involucres 5-lobed; plants annual or perennial with open inflorescences, the lower nodes with 3-5 branchlets, the upper nodes dichotomous or trichotomous; flowers 1-3 mm long; stems usually inflated; southern and eastern Utah.
 48. *E. inflatum*
- EE. Involucres 4-lobed; plants strictly annual with whorls of branches (often 5-20) radiating from the lower nodes, the upper branches with several branchlets at each node; flowers mostly 1-2 mm long; stems usually not inflated; Washington Co. 49. *E. trichopes*
- DD. Plants glandular; involucres mostly 5-lobed; peduncles slender, straight or curved upwards, glandular only on the lower half; flowers 1-1.5 (2) mm long; rare, western Utah. 50. *E. howellianum*
- CC. Involucres composed of two distinct whorls of 3 lobes.
- D. Leaves strictly basal; peduncles 1-3 cm long, flexed; plants erect, sparsely glandular; infrequent, eastern Utah. 51. *E. flexum*
- DD. Leaves basal and cauline; peduncles up to 4 cm long, often lacking, straight; plants spreading, glabrous; eastern Utah. . 52. *E. salsuginosum*
- BB. Flowers glabrous, white, 1-2.5 mm long; stems glabrous or sparsely villous; eastern Utah. . 53. *E. gordonii*
- AA. Leaves tomentose to lanate, at least below.
- B. Leaves strictly basal or sheathing up the stems.
- C. Involucres 1-3 mm long, or if shorter, then flowers with saccate-dilated bases on the outer tepals.
- D. Flowers glabrous without.
- E. Outer tepals cordate at the base, mostly oblong to orbicular, or if obtuse at the base, then plants scabrellous or margins of the tepals entire and not crispate.
- F. Involucres deflexed.
- G. Plants glabrous.
- H. Involucres turbinate; flowers white to pink; western and southern Utah.
 54. *E. deflexum*
- HH. Involucres broadly campanulate; flowers yellow to reddish-yellow; common. . 55. *E. hookeri*
- GG. Plants glandular throughout; common, Washington Co. 56. *E. brachypodium*

- FF. Involucres erect or arising from the side of the stem and remaining horizontal.
- G. Stems and branches glabrous; involucres erect; Washington Co. 57. *E. insigne*
- GG. Stems and branches scabrellous; involucres horizontal, beyond turned downward at maturity; eastern Utah along the Colorado drainage system. 58. *E. scabrellum*
- EE. Outer tepals truncate to obtuse at the base.
- F. Outer tepals pandurate, crisped along the margins; peduncles cernuous or ascending, glabrous; common throughout the state. 59. *E. cernuum*
- FF. Outer tepals oblong to oval, entire margined; peduncles curving downward, glandular; northern Utah. 60. *E. nutans*
- DD. Flowers glandular or sparsely pubescent.
- E. Involucres glabrous without; flowers short-hispidulous, the outer tepals saccate on both sides of the base; Washington Co. 61. *E. thomasi*
- EE. Involucres glandular without; flowers glandular, the outer tepals not saccate; Washington Co. 62. *E. pusillum*
- CC. Involucres 0.3-1 mm long.
- D. Flowers yellow to red, 0.5-1.5 mm long; involucres 4-lobed; inflorescences densely branched and spreading; sandy soil, eastern Utah. 63. *E. wetherillii*
- DD. Flowers white to pink or rose, 0.8-2 mm long; involucres 5-lobed; inflorescences open and erect; clay hills, southern Utah. 64. *E. subreniforme*
- BB. Leaves basal and cauline.
- C. Flowers glabrous, yellow; leaves linear or nearly so; involucres with + erect lobes; rare, desert ranges of western Utah. 65. *E. pharnaceoides*
- CC. Flowers glandular, white to pale-yellow or pink to red; leaves lanceolate to obovate; involucres with short, erect teeth; deserts of western Utah. 66. *E. maculatum*

V. OREGONIUM. *Annuals with ribbed or angled involucres*

- A. Leaves tomentose, at least below.
- B. Stems glabrous; leaves basal; flowers glabrous; Washington and Kane cos. 67. *E. davidsonii*
- BB. Stems tomentose to floccose.
- C. Leaves basal; plants low and spreading.
- D. Flowers yellow to red, the outer tepals broadly fan-shaped; western Utah. 68. *E. nidularium*

- DD. Flowers white, the outer tepals narrowly fan-shaped; western and southern Utah. 69. *E. palmerianum*
- CC. Leaves cauline; plants strict, tall and erect; rare in Washington and Kane cos. 70. *E. polycladon*
- AA. Leaves puberulent to villous.
- B. Stem-leaves foliaceous at the lower nodes, puberulent or short pilose; involucre 5-lobed; flowers yellowish, hispidulous and often glandular, 1.5-2 mm long; eastern and central Utah on clay slopes. 71. *E. divaricatum*
- BB. Stem-leaves bract-like, silky-pubescent; involucre 4-lobed; flowers white to red, glabrous or hispidulous, 1-1.5 mm long; southwestern Utah. . . . 72. *E. puberulum*

SUBGENUS EUCYCLA (NUTT.) KUNTZE

1. *E. FASCICULATUM* Benth. var. *POLIFOLIUM* (Benth. in DC.) Torr. & Gray. [*E.p.* Benth. in DC. *E. revolutum* Goodd. *E.f.* ssp. *p.* S. Stokes. *E.f.* var. *r.* S.Stokes.] Low rounded and ± compact or spreading subshrubs or shrubs 2-5 (8) dm high and up to 1 m across; leaves fascicled, mostly oblanceolate, 6-18 mm long, (1) 2-6 mm wide, often revolute, canescent on both surfaces or tomentose below and canescent above; stems 3-15 cm long, thinly tomentose to canescent; inflorescences congested or nearly so, occasionally umbellate; involucre turbinate to turbinate-campanulate, 2.5-3.5 mm long, 2-3.5 mm wide, canescent without; flowers white to pink, 2.5-3 mm long, pubescent without on the base and midrib; achenes light brown, 2-2.5 mm long.---Rocky places mostly in the low desert ranges of Washington Co.; s. to w. Ariz. and w. across s. Nev. and e. Calif. to Baja Calif. Apr-Jul.

2. *E. LEPTOCLADON* Torr. & Gray. Large erect to spreading diffusely branched shrubs (2) 3-10 (13) dm high, 0.5-1.5 (2) m across; leaves linear-lanceolate to linear-oblanceolate or narrowly oblong, 1.5-4.5 cm long, 2-8 mm wide, densely white-tomentose below, less so and often greenish above, the margin slightly revolute in some, the petiole 2-5 mm long; stems 3-10 cm long, tomentose to floccose or glabrous; inflorescences large, open, cymose, 1-4 dm long, 1-5 dm across, lightly tomentose to floccose or glabrous, the involucre racemously arranged at the tips of the branches and branchlets; involucre turbinate to turbinate-campanulate, 1.5-3 mm long, 1-2 mm wide, tomentose to glabrous without, the 5 acute to rounded teeth 0.4-0.7 mm long; flowers white or pale-yellow to yellow with reddish-brown to brown midribs and bases, (2) 2.5-3.5 mm long, glabrous, the tepals obovate to nearly fan-shaped, the inner whorl usually slightly narrower; achenes light brown, 2.5-3.5 mm long.---Sandy places of e. Utah from Emery and Grand cos. s. to N.M. and Ariz.

VAR. *LEPTOCLADON*. [*E. microthecum* var. *l.* Torr. & Gray. *E. effusum* ssp. *l.* S.Stokes. *E.e.* var. *shandsii* S.Stokes.] Stems floccose and often greenish; flowers pale-yellow to yellow.---Sandy

places in Emery and Grand cos. s. to e. Garfield and central San Juan Co. Endemic. Jul-Sep.

VAR. RAMOSISSIMUM (Eastw.) Reveal. [*E.r.* Eastw. *E. eastwoodae* M.E. Jones.] Stems tomentose to floccose; flowers white.---Common in sandy places from s. Emery Co. s into Kane and San Juan cos.; sw. Colo., nw. N.M. and ne. Ariz. Jun-Oct.

VAR. PAPILIUNCULUM Reveal. Stems glabrous; flowers white.---Infrequent in central Garfield and e. Kane cos.; s. to n. Ariz. Aug-Oct.

3. *E. KEARNEYI* Tidestr. [*E. nodosum* var. *k.* S.Stokes. *E. dudleyanum* S.Stokes.] Low to tall spreading subshrubs to shrubs 2-8 dm high, 0.3-1 (1.3) m across; leaves broadly oblanceolate to elliptic, 1-2.5 (3) cm long, 4-12 (15) mm wide, densely white-tomentose below, slightly less so and greenish above, the margin not revolute, the petiole 2-10 mm long; stems 5-10 cm long, tomentose; inflorescences large, open, cymose, 0.5-5 dm long, 0.5-8 dm across, tomentose, the involucre racemosely arranged at the tips of the branches; peduncles, when present, up to 5 mm long, tomentose; involucre turbinate, 2-2.5 mm long, 1.5-2 mm wide, tomentose without, the 5 acute teeth 0.1-0.4 mm long; flowers white with reddish to reddish-brown midribs and bases, 1.5-3 mm long, glabrous, the tepals obovate, the inner whorl slightly narrower; achenes light brown, 2-3 mm long.---Sandy places in w. and sw. Utah, ranging from e. Tooele Co. s. to n. Millard Co., then re-entering the state in Washington and Kane cos.; e. Calif., Nev. e. to nw. Ariz. Jul-Sep.

A rather variable species in Utah, *Eriogonum kearneyi* may be recognized by its broad leaves. It is, however, closely related to *E. leptocladon*, and especially var. *ramosissimum*. The two can be separated only with some difficulty in Kane Co. To the west of us, *E. kearneyi* is found in widely scattered locations, becoming differentiated into a var. *moncense* (S.Stokes) Reveal in eastern California.

4. *E. AMMOPHILUM* Reveal. Low subshrubs 2-4 dm high, 2-5 dm across; leaves elliptic to broadly elliptic, 1-2.5 (2.8) cm long, 8-17 mm wide, densely white-tomentose below, less so to subglabrous and green above, the petiole 1-5 (15) mm long; stems 5-15 cm long, glabrous; inflorescences large, open, cymose, 5-20 cm long, up to 25 cm across, glabrous, the involucre racemosely arranged only at the very tips of the branches; peduncles (2) 5-10 (12) mm long, glabrous; involucre turbinate, (2.5) 3-3.5 mm long, 2-2.5 mm wide, glabrous, the 5 acute teeth 0.4-0.8 mm long; flowers white with reddish-brown midribs and bases, 2-3 mm long, glabrous, the tepals narrowly obovate, the inner whorl slightly narrower; achenes light brown, 2.5-3 (3.5) mm long.---Infrequent in dry sandy places in w-central Millard Co. Endemic. Jun-Sep.

This new species, described in 1972, is rare in the few known locations it has been found to date.

5. *E. NUMMULARE* M.E. Jones. Low subshrubs 1-2 (2.5) dm high, 2-5 dm across; leaves orbicular or rotund, 0.5-1 cm in diameter, densely white-tomentose on both surfaces, the petiole 3-5 mm long; stems 3-7 cm long, densely tomentose; inflorescences large, open, cymose, 1-1.5 dm long, 0.5-1 dm across, densely tomentose, the involucre racemosely arranged only at the very tips of the branches; peduncles 2-8 (10) mm long, tomentose; involucre turbinate, 1.5-2 mm long, 1.2-1.8 mm wide, tomentose, the 5 acute teeth 0.3-0.7 mm long; flowers white with reddish-brown midribs and bases, 1.6-2 mm long, glabrous, the tepals oblong; achenes light brown, 2 mm long.---Dry sandy places in w. Tooele and Juab cos. Endemic. Jun-Aug.

6. *E. SMITHII* Reveal. Large erect to spreading totally glabrous shrubs (3) 4-8 dm high, 0.5-2 m across; leaves narrowly elliptic, 2.5-4.5 cm long, 6-10 mm wide, the margin thickened and usually revolute, the petiole 3-5 mm long; stems 2-20 cm long; inflorescences open to + compact, cymose, 2-25 cm long, 3-35 cm wide, divided 3-6 times, bright green; involucre turbinate, (2.5) 3-3.5 mm long, 2-2.5 mm wide, the 5 acute teeth 0.3-0.5 mm long; flowers bright yellow, 3-4 mm long, glabrous, the tepals obovate, the inner whorl slightly narrower; achenes brown, 3 mm long.---Locally common in deep red "blow" sand in s. San Rafael Desert, Emery Co. Endemic. Jul-Sep.

7. *E. MORTONIANUM* Reveal. Large erect totally glabrous shrubs 4-8 (10) dm high, 0.5-1 (1.3) m across; leaves elliptic, 1.5-4 (4.5) cm long, (3) 6-10 (12) mm wide, the margin thickened and not revolute, the petiole (2) 3-8 (10) mm long; stems 5-10 (12) cm long; inflorescences large, open, cymose, 15-25 cm long, 15-30 cm wide, divided 10-20 times, pale-yellowish-green; involucre turbinate, 2-2.5 mm long, 1.2-1.8 (2) mm wide, the 5 acute teeth 0.3-0.4 mm long; flowers pale-yellow to white, (2) 2.5-3 mm long, glabrous, the tepals obovate, the inner whorl slightly narrower; achenes light brown, 3-3.5 mm long.---Known presently only from red clay hills 4.5 mi sw. of Fredonia, Mohave Co., Arizona, but to be expected in s. Kane Co. Jul-Sep.

The two glabrous shrubs, *E. smithii* and *E. mortonianum*, are the only species which have a nearly total lack of pubescence. However, on close inspection, some can be found. The early leaves, for example, may be faintly pubescent along the midrib on the upper surface, and some pubescence can be observed in the axil of the leaves and on the inner surface of the involucre tube. Still when casually observed, these two species appear to be glabrous.

8. *E. CORYMBOSUM* Benth. in DC. Low spreading subshrubs to tall and erect to rounded shrubs (2) 3-8 (12) dm high, 0.4-1.5 (2) m across; leaves lanceolate to oblanceolate or elliptic to nearly orbicular, 1-3 (4.5) cm long, (0.3) 0.5-3 (3.5) cm wide, densely white-tomentose on both surfaces or less so to subglabrous or glabrous

and green above, the margin entire or crenulate, not revolute, the petiole 2-15 mm long; stems (0.5) 1-2 dm long, tomentose to subglabrous or rarely glabrous; inflorescences cymose, (1) 2.5-20 cm long, 2-30 cm wide, tomentose to glabrous; involucre turbinate, 1.5-3.5 mm long, 1-2 (2.5) mm wide, tomentose to glabrous without, the 5 acute teeth 0.3-1 mm long; flowers white with greenish or reddish midribs and bases, whitish-brown with reddish bases, or yellow, 2.5-3.5 (4) mm long, glabrous, the tepals oblanceolate to spatulate, the inner whorl slightly narrower; achenes brown, 2-2.5 (3) mm long.---Rather common on clay hills and flats in e. and s. Utah; e. to sw. Wyo., w. Colo., n. N.M., and into n. Ariz. and s. Nev.

Since this species was reviewed (Reveal, 1968b) one new species has been described by Welsh (1970) and reduced to synonymy by me (Reveal, 1971), while recent field studies in Wyoming have shown that *E. salinum* A.Nels. is not a synonym of var. *corymbosum* but of var. *erectum*.

KEY TO THE VARIETIES

- A. Flowers white to brownish-white, not yellow.
- B. Leaves oblanceolate to elliptic, 1-3 (4.5) cm long, 1-2 cm wide, the petiole 2-6 mm long.
- C. Involucres 1.5-2.5 mm long, 1-1.5 mm wide; stems spreading into subglobose crowns, the branches white-tomentose; flowers white; mostly below 6000 feet in e. and s. Utah. var. *corymbosum*
- CC. Involucres 2.5-3.5 mm long, 1.5-2 mm wide.
- D. Stems and crowns open and erect, the branches brownish-tomentose; leaves 2-3.5 cm long, 0.5-1.5 cm wide, brownish-tomentose; mostly above 6000 feet, ne. Utah var. *erectum*
- DD. Stems and crowns spreading, the branches silvery-tomentose; leaves 3-4 cm long, (0.5) 1-2 cm wide, silvery-tomentose; Carbon Co. var. *davidsei*
- BB. Leaves elliptical-oblong to nearly orbicular, 1-3 (4) cm long, 1-3 (3.5) cm wide, the petiole 5-10 (15) mm long.
- C. Plants greenish; leaves mostly thinly tomentose below, subglabrous to glabrous and green above; flowers 2.5-3 mm long; sandy places, e. Utah. var. *orbiculatum*
- CC. Plants brownish-white; leaves densely tomentose below, floccose above; flowers 2-2.5 mm long; clay hills and bluffs, San Juan Co. var. *velutinum*
- AA. Flowers yellow; stems and branches glabrous to floccose; s. and sw. Utah in sandy to clay soil. var. *glutinatum*

VAR. CORYMBOSUM. [E.c. var. *divaricatum* Torr. & Gray. *E. divergens* Small. *E. effusum* ssp. c. S.Stokes. *E.e.* ssp. *divaricatum* S. Stokes. *E.e.* ssp. *durum* S.Stokes. *E. revealianum* Welsh.] Subshrubs to shrubs 3-8 dm high, the crown suberect to subglobose, up to 1 m across; leaves lanceolate to oblanceolate or elliptic, 1-3 (4.5) cm long, (0.3) 0.5-1 (1.5) cm wide; inflorescences 3-10 cm long, usually densely tomentose; involucre 1.5-2.5 mm long, 1-1.5 mm

wide; flowers white, 2-3 (3.5) mm long.---Dry clay hillsides and flats from ne. Utah sw. to Kane Co., and s. to Grand Co.; e. to w. Colo. and in n. Ariz. Jul-Oct.

VAR. ERECTUM Reveal & Brotherson. [*E. salinum* A.Nels. *E. effusum* ssp. s. S.Stokes.] Erect shrubs (3) 6-10 dm high and up to 8 dm across; leaves lanceolate to elliptic, 2-3.5 cm long, 0.5-1.5 cm wide, brownish-tomentose below, less so to subglabrous and greenish above; inflorescences 2.5-7 cm long, usually densely tomentose; involucre 2.5-3.5 mm long, 1.5-2 mm wide; flowers brownish-white, 2.5-3 mm long.---Mostly in pinyon-juniper woodlands above 6000 feet in Duchesne, Utah and Uintah cos.; disjunctly in Sweetwater Co., Wyo. Jul-Sep.

This variety will frequently form hybrid populations with *E. brevicaulis*. These intermediate forms are here recognized as *E. Xduchesense* (see # 10 below).

VAR. DAVIDSEI Reveal. Large spreading shrubs 8-12 dm high and 5-15 (20) dm across; leaves lanceolate to elliptic, 3-4 cm long, (0.5) 1-2 cm wide, densely silvery-tomentose below, slightly less so above; inflorescences 3-6 cm long, tomentose; involucre 2.5-3 mm long, 1.5-2 mm wide; flowers brownish-white, 2-2.5 mm long.---Endemic to clay hills just south of Wellington, Carbon Co. Endemic. Jul-Oct.

VAR. ORBICULATUM (S.Stokes) Reveal & Brotherson. [*E. effusum* ssp. o. S.Stokes.] Large compact and hemispheric shrubs (3) 5-12 dm high, 0.5-2 m across; leaves mostly orbicular, 1-3 cm long and wide, floccose to thinly tomentose on both surfaces, usually deep green; inflorescences dense, up to 2 dm long and 3 dm across, of rigid branches; flowers white, 2.5-3 mm long.---Common in sandy soil along the Colorado River drainage from Emery and Grand cos. s. into San Juan Co.; e. into w -central Colo. and perhaps in nw. N.M. Jul-Oct.

VAR. VELUTINUM Reveal: Large shrubs 5-10 dm high, 0.5-2 m across; leaves mostly oblong, 2-2.5 (3.5) cm long, 1.5-2.5 (3) cm wide, densely tomentose below, floccose above; inflorescences dense to + open, 4-10 cm long, of stout but not rigid branches; flowers brownish-white, 2-2.5 mm long.---Clay hills and bluffs of San Juan Co.; n -central N.M. and e. Ariz. Jul-Oct.

When originally proposed in 1968, this variety was thought to be restricted to central New Mexico. Since then additional collections have shown var. *velutinum* to occur in eastern Arizona, and reevaluation of some older material from Utah has made it necessary to include the variety in this state as well.

VAR. GLUTINOSUM (M.E. Jones) M.E. Jones. [*E. aureum* M.E. Jones. *E. a.* var. *g.* M.E. Jones. *E. fruticosum* A.Nels. *E. f.* var. *g.* A.Nels. *E. crispum* L.O. Will. *E. microthecum* ssp. *a.* S.Stokes. *E. m.* var. *c.* S.Stokes.] Low subshrubs to large rounded shrubs 2-10 dm high, (3) 5-20 dm across; leaves lanceolate to oblanceolate or elliptic, 1-4 cm long, 0.5-1.5 cm wide; inflorescences 3-10 cm long, glabrous to

tomentose; involucre 1-2 mm long, 1-1.5 (2) mm wide; flowers yellow, 1.5-2.5 mm long.---Rather common in s. Utah from Garfield Co. sw. to Kane and Washington cos.; s. to n. Ariz. and w. to s. Nev. Jul-Oct.

9. *E. HYLOPHILUM* Reveal & Brotherson. Low subshrubs 2.5-4 dm high, 2-5 dm across; leaves linear-lanceolate to lanceolate, 3.5-7 cm long, 3-6 (8) mm wide, densely white-tomentose below, less so to floccose and green above, the margin infrequently crenulate or revolute, the petiole 5-10 (18) mm long; stems 0.5-1.5 dm long, tomentose; inflorescences cymose-umbellate to cymose, open, 3-8 cm long and wide, tomentose; involucre turbinate, 3.5-4 mm long, 2.5-3 mm wide, tomentose, the 5 (6) acute teeth 0.5-0.8 mm long; flowers white, (3) 3.5-4 (4.5) mm long, glabrous, the tepals spatulate to oblanceolate, the inner whorl narrower; achenes brown, 2.5-3 mm long.---Endemic to the Bad Land Cliffs, Duchesne Co. Jul-Sep.

10. *E. XDUCHESENSE* Reveal. (*pro. sp.*). [*E. corymbosum* var. *albogilvum* Reveal.] Low spreading subshrubs to rounded shrubs 2-4 (5) dm high, 3-5 (8) dm across; leaves lanceolate to spatulate or elliptic, (1) 2-4 cm long, (4) 5-10 mm wide, densely white-tomentose below, floccose and greenish above, the margin often crenulate, the petiole 4-7 mm long; stems (0.3) 0.5-1 dm long, tomentose; inflorescences cymose, open to \pm compact, (1) 3-10 cm long, (3) 5-15 cm wide, tomentose; involucre turbinate, (2.5) 3-3.5 mm long, (1.5) 2-2.5 mm wide, tomentose, the 5 deltoid to acute teeth (0.3) 0.5-1 (1.2) mm long; flowers pale-yellow to yellow, 2.5-3 mm long, glabrous, the tepals narrowly obcordate; achenes brown, 2-3 mm long.---Widely scattered locations in Utah and Duchesne cos.; ne. to s. Sweetwater Co., Wyo. Jul-Sep.

The status of the name *Eriogonum duchesnense* is changed to a hybrid species (Stafleu, et al., 1972) at this time following extensive field work in northeastern Utah and southwestern Wyoming where small populations were found which represented clear hybrid swarms between *E. corymbosum* var. *erectum* and *E. brevicaule* var. *brevicaule*. As these plants are distinct and often collected, a formal name is applied to them.

11. *E. LANCIFOLIUM* Reveal & Brotherson. Low sparsely branched shrubs 3.5-5 dm high, 3-6 dm across; leaves lanceolate, 3-5 cm long and 0.5-1 cm wide, densely white-tomentose below, less so to subglabrous and greenish above, the margin often crenulate, revolute in some, the petiole 3-6 mm long; stems 3-8 cm long, floccose to subglabrous; inflorescences cymose, dense, 6-14 cm long, 4-10 cm wide, floccose to subglabrous; involucre turbinate, 2.5-3 mm long, 1.5-2 mm wide, tomentose to floccose, the 5 acute teeth 0.3-0.7 mm long; flowers white, 3-3.5 mm long, glabrous, the outer whorl of tepals spatulate, the inner whorl distinctly narrower and oblanceolate; achenes brown, 2 mm long.---Endemic to clay hills in the Price and Wellington area, Carbon Co. Jul-Sep.

12. *E. SAURINUM* Reveal. Large erect shrubs 3-5 dm high, 3-6 dm across; leaves lanceolate, 3-6 cm long, 4-8 mm wide, densely white-tomentose below, floccose and green above, the petiole 5-10 mm long; stems 1.5-3 dm long, glabrous; inflorescences cymose, \pm dense to open, 1-2 dm long, 0.5-1.5 dm wide, glabrous; involucre turbinate, 2-3 mm long, 1.5-2 mm wide, glabrous, the 5 acute to rounded teeth 0.4-0.6 mm long; flowers cream to pale yellowish-white, 2-3 mm long, glabrous, the tepals oblanceolate; achenes light brown, 2.5-3 mm long.---Restricted to Mowry Shale n. and ne. of Vernal, Uintah Co.; nw. Colo. Jul-Sep.

13. *E. MICROTHECUM* Nutt. Low to tall, spreading to erect, open to compact subshrubs to shrubs 0.4-10 dm high, 0.6-1.3 m across; leaves mostly elliptic 0.5-2 (2.5) cm long, 0.5-6 mm wide, tomentose below, slightly less so to nearly glabrous above, the margin flat or revolute, the petiole 0.5-5 mm long; stems 1-8 cm long, tomentose to floccose or glabrous; inflorescences cymose, rather congested and compact, 1-6 (8) cm long, 1-8 cm wide, tomentose to glabrous; peduncles, when present, up to 1 cm long, tomentose to glabrous; involucre turbinate, 2-3 (3.5) mm long, 1.3-2.5 (3) mm wide, tomentose to floccose or rarely subglabrous, the 5 rounded to triangular teeth (0.3) 0.5-1 mm long; flowers white with green to reddish-brown bases and midribs, 2-3 mm long, glabrous, the tepals obovate, the inner whorl slightly narrower; achenes light brown to brown, 2-3 mm long.---Widespread desert and montane shrub of e. Wash. s. to s. Calif., e. across Ida., w. Mont. and w. Wyo. to central Colo., nw. N.M. and n. Ariz. Jun-Oct.

The *Eriogonum microthecum* complex is composed of nine varieties found throughout much of the western United States (Reveal, 1971). In Utah, it has two of the more common variants, var. *laxiflorum* and var. *foliosum*. A third variant is to be expected in Utah, the var. *lapidicola*, which comes close to the state in western Lincoln Co., Nevada. A Purpus collection (6249) from an unknown location in western Utah may be this variant, but until additional material of this plant is found, it is impossible to assign the Purpus collection with any confidence to either var. *foliosum* or var. *lapidicola*.

VAR. *LAXIFLORUM* Hook. [*E. tenellum* var. *grandiflorum* Gand. E.m. ssp. *l.* S.Stokes.] Low to erect, spreading to sparsely branched subshrubs or low shrubs (1) 2-4 (5) dm high, 2-8 dm across; leaves mostly elliptic, (0.5) 1-2 (2.5) cm long, (1.5) 2.5-6 mm wide, densely to sparsely white-tomentose below, less so to floccose above, the margin plane or with thickened margins, not revolute; stems 2-6 (8) cm long, floccose to sparsely tomentose when young, becoming glabrous or subglabrous and greenish; inflorescences (1) 2-4 (8) cm long, floccose to glabrous; involucre 2-3 (3.5) mm long, mostly subglabrous or glabrous; flowers white, 2-3 mm long.---Found throughout Utah in all sections except the se. quarter of the state; e. Wash. and w. Mont. s. to e. Calif., s. Nev. and n. Ariz. Jun-Sep. This is the common phase of the species.

VAR. FOLIOSUM (Torr. & Gray) Reveal. [*E. effusum* var. *f.* Torr. & Gray. *E. simpsonii* Benth. in DC. *E.m.* var. *rigidum* Eastw. *E. friscanum* M.E. Jones. *E. nelsonii* L.Will. *E.m.* ssp. *r.* S.Stokes. *E.m.* var. *friscanum* S.Stokes. *E.e.* ssp. *s.* S.Stokes. *E.e.* ssp. *n.* S. Stokes.] Low to erect, spreading to sparsely branched subshrubs or shrubs 1-10 dm high, 1-12 dm across; leaves mostly narrowly elliptic, 0.5-1.8 (2) cm long, (0.5) 1-2 (2.5) mm wide, densely white tomentose below, floccose and whitish-green above, the margin revolute; stems 2-7 cm long, densely lanate to tomentose; inflorescences (1.5) 2-4 (6) cm long, tomentose to floccose; involucre 2-3 mm long, mostly tomentose to floccose; flowers white, 2-3 mm long. ---Common on clay hills and desert slopes in the e. third of Utah and in the sw. part of the state on mostly limestone hills and valley floors; s. Nev. e. to w. and s-central Colo., s. to n. Ariz. and nw. N.M. Jun-Oct.

The var. *lapidicola* Reveal is to be expected in southwestern Utah. It differs from var. *foliosum* in having brownish or reddish tomentum, elliptical leaves 3-7 mm long and 1-4 mm wide, longer involucre ranging from (2.5) 3-3.5 mm long, and whitish flowers which frequently becoming red to rose with age. This low subshrub rarely exceeds 1.5 dm in height.

14. *E. LEPTOPHYLLUM* (Torr. in Sitgr.) Woot. & Stand. Large, rounded, heavily-branched shrubs 2-6 dm high, 0.3-1 m across; leaves linear to linear-oblanceolate, (1.5) 2-6 cm long, (0.8) 1-2.5 (3) mm wide, densely to thinly white-tomentose below, glabrous and green above, the margin tightly revolute, the petiole 0.4-1 mm long; stems 1-8 cm long, glabrous; inflorescences cymose, dense and broom-like with numerous glabrous branches, 2-15 cm long, 4-15 cm wide; involucre narrowly turbinate, 2-3 mm long, 1.1-1.7 (2) mm wide, glabrous, the 5 acute teeth 0.3-0.7 mm long; flowers white with greenish-brown midribs and bases, 2.5-4 mm long, glabrous, the tepals oblong to narrowly obovate; achenes brown, 3.5-4 mm long. --- Not known from Utah but to be expected in se. San Juan Co.; sw. Colo. s. to ne. Ariz. and nw. N.M. Jul-Oct.

15. *E. CLAVELLATUM* Small. Low rounded subshrubs 1-2 dm high, 3-8 dm across; leaves oblanceolate, 5-12 (15) mm long, 0.8-1.7 (2) mm wide, densely white-tomentose below, thinly pubescent and green above but becoming glabrous, the margin tightly revolute, the petiole 0.5-1.5 mm long; stems 0.6-2 cm long, usually glabrous; inflorescences umbellate-cymose, 0.5-1.5 cm long, 1-2 cm wide, glabrous; peduncles slender, 1.5-4 mm long, glabrous; involucre turbinate-campanulate, (3.5) 4-4.5 mm long, 2.5-4.5 mm wide, glabrous, the 5 acute teeth 0.6-0.9 mm long; flowers white with greenish-brown to reddish-brown midribs and bases, 3-3.5 mm long, glabrous, the tepals dimorphic, the outer whorl broadly obovate to nearly fan-shaped, 2-2.5 mm wide, those of the inner whorl oblanceolate to spatulate, 0.9-1.5 mm wide and slightly shorter; achenes light brown, 3-3.5 mm long. ---Clay hills and slopes, s-central San Juan Co. near Bluff. Endemic. Apr-Jun.

16. *E. BICOLOR* M.E. Jones. [*E. microthecum* ssp. *b.* S.Stokes.] Low rounded subshrubs 2-6 cm high, 5-20 (30) cm across; leaves linear-ob lanceolate to narrowly elliptic, 5-12 (15) mm long, 1-2 (3) mm wide, densely white-tomentose below, slightly less so above, the margin revolute, the petiole 1-1.5 mm long; stems 3-22 mm long, densely tomentose; inflorescences umbellate-cymose, 5-10 mm long, 5-15 mm wide, rarely reduced to a single ray, tomentose; peduncles 1.5-3 (4) mm long, tomentose to subglabrous; involucre turbinate-campanulate, 2-4 mm long, 1.5-3 mm wide, tomentose to subglabrous or glabrous, the 5 acute teeth 0.4-0.7 mm long; flowers white with greenish-brown to reddish-brown midribs and bases, 2.5-4 mm long, glabrous, the tepals dimorphic, the outer whorl broadly obovate to nearly orbicular, (2) 2.5-3 mm wide, the inner whorl oblanceolate to narrowly elliptic, 1-1.5 mm wide, slightly shorter; achenes light brown, 3-3.5 mm long.---Infrequent on clay to gumbo clay hills and flats in e. Utah, from Carbon Co. s. to e. Garfield and n. San Juan Co.; e. to w. Colo. Apr-Jun.

17. *E. HEERMANNII* Dur. & Hilg. Low spreading divaricately branched subshrubs 1-4 dm high and 1.5-6 dm across, or low spreading shrubs 3-6 dm high and 3-8 dm across; leaves linear-lanceolate to elliptic or spatulate, 4-12 mm long, 2-5 mm wide, sparsely to densely tomentose below, subglabrous to glabrous above, the margin flat or slightly revolute, the petiole 3-10 mm long; stems 0.3-4 cm long, glabrous, scabrous or smooth, angled or ribbed in some; inflorescences cymose panicles, mostly clustered, with slender rigid angled or ribbed branches arranged in inflorescences 1-5 cm long and 3-10 cm wide, or with stout rigid smooth branches arranged in inflorescences 1-1.5 dm long, 1-2 dm wide; involucre campanulate, 0.7-1.5 mm long and wide, glabrous, the 5 rounded teeth 0.3-0.5 mm long; flowers yellowish-white, 1.5-2 mm long, glabrous, the tepals dimorphic, the outer whorl of tepals obovate to orbicular, those of the inner whorl lanceolate; achenes light brown, 2-2.5 mm long.---Locally common in Washington Co.; w. across Nev. to Calif. and s. to central Ariz.

VAR. *SUBRACEMOSUM* (S.Stokes) Reveal. [*E. howellii* var. *s.* S. Stokes.] Low shrub 3-6 dm high, 3-8 dm across with smooth, scabrous stems, the branches often somewhat spinelike.---Virgin Narrows in sw. Washington Co.; s. to Coconino Co., Ariz. Aug-Sep.

VAR. *SULCATUM* (S.Wats.) Munz & Reveal. [*E.s.* S.Wats. *E.h.* ssp. *s.* S.Stokes.] Low subshrubs 1-4 dm high, 1.5-6 dm across with angled or ribbed stems.---Locally common in Washington Co.; w. across s. Nev. to e. Calif. and s. to nw. Ariz. Jul-Sep.

18. *E. PLUMATELLA* Dur. & Hilg. [*E. palmeri* S.Wats.] Open erect shrubs 3-6 dm high, 3-8 dm across; leaves oblanceolate to oblong-lanceolate, 6-15 mm long, 2-4 mm wide, tomentose, the margin entire, the petiole 1-5 mm long; stems stout, tomentose; involucre turbinate, 2-2.5 mm long, 1.5-2 mm wide, glabrous, the 5 rounded teeth 0.4-0.6 mm long; flowers pale-yellow to white, 2-2.5 mm long,

glabrous, the tepals slightly dimorphic, those of the outer whorl obovate, those of the inner whorl oblong; achenes light brown to brown, 2.5-3 mm long.---Reportedly obtained from sw. Utah, most likely Washington Co., in the 1870s; s. Nev. and w. Ariz. w. to se. Calif. Aug-Nov.

19. *E. BREVICAULE* Nutt. Spreading herbaceous perennials 1-5 dm high, 0.5-4 dm across; leaves linear, oblanceolate, elliptic or spatulate, (1.5) 3-7 (10) cm long, 1-7 mm wide, densely tomentose below, less so to floccose or even glabrous and green above, the margin entire or crenulate, flat or revolute, the petiole 0.3-2 (4) cm long; stems (0.5) 1-2 (2.5) dm long, tomentose to floccose or glabrous; inflorescences cymose to capitate or umbellate, (1) 3-10 (25) cm long, 1-10 (15) cm wide, tomentose to glabrous; peduncles, when present, up to 3 cm long, erect, glabrous; involucre solitary or clustered, turbinate to turbinate-campanulate, 2-4 mm long, (1) 1.5-2.5 (3) mm wide, tomentose to glabrous, the 5 acute teeth 0.3-1 mm long; flowers yellow to cream or white, 2-4 mm long, glabrous, the tepals oblong to obovate or ovate to oval; achenes light brown, 2-3 mm long.---Central and n. Utah n. to sw. Ida. e. to Wyo. and Colo. Jun-Sep.

The *Eriogonum brevicaule* complex is a rather difficult group of species which are not yet fully understood. In 1969, a number of discordant elements were included in the definition of var. *brevicaule* and are here still retained. Since then, field work has shown other, equally interesting, populations exist which have not been given formal recognition in the past, and would have to be if one decided to attempt a fragmentation of the variety into additional entities.

Some forms which are worthy of formal recognition are not announced at this time primarily due to a paucity of material. One, a new species, was collected by M.E. Jones in eastern Utah in two locations, but repeated attempts to discover this plant has resulted in failure. This plant has yellow flowers, a cymose-umbellate inflorescence with tomentose to floccose stems and branches and broadly elliptical leaves 1-2 cm long and 8-12 mm wide. Jones collected it near Moab, Grand Co. and Mounds, in Carbon Co. A new variant of *Eriogonum brevicaule* is also known, but until studied in the field, no formal recognition is proposed.

KEY TO THE VARIETIES

- A. Flowers yellow, or if cream, then stem pubescent.
 - B. Stems glabrous; inflorescence cymose. var. *brevicaule*
 - BB. Stems floccose to tomentose, or if glabrous, then inflorescences capitate.
 - C. Inflorescences cymose; flowers yellow. var. *cottamii*
 - CC. Inflorescences capitate or subcapitate to umbellate; flowers yellow to cream. . . . var. *laxifolium*
 - AA. Flowers white; inflorescences cymose. var. *wasatchense*
- VAR. *BREVICAULE*. [*E. campanulatum* Nutt. *E. confertiflorum* var.

stansburyi Benth. in DC. *E. c.* ssp. *b.* S.Stokes. *E. nudicaule* ssp. *garrettii* S.Stokes. *E. n.* ssp. *parleyense* S.Stokes. *E. b.* ssp. *c.* S. Stokes.] Plants (1.5) 2-4 (5) dm high; leaves linear to oblanceolate, 3-10 cm long, 1-7 mm wide, tomentose below, less so to glabrous above, flat or revolute; stems 1-2.5 dm long, glabrous; inflorescences cymose, (3) 5-25 cm long; involucre turbinate, 2-4 mm long, (1) 1.5-2.5 mm wide, glabrous; flowers yellow, 2.5-3 mm long.---Common throughout much of n. Utah from the valley floors to the mountain passes of the Wasatch and Uinta mountains; se. Ida. e. to e. Wyo. s. to n. Colo. Jun-Sep.

VAR. COTTAMII (S.Stokes) Reveal. [*E. tenellum* ssp. *c.* S.Stokes.] Plants 1-1.5 dm high; leaves narrowly oblanceolate to narrowly elliptic, 3-7 cm long, 3-5 mm wide, brownish-tomentose, the margin flat; stems 0.5-1 dm long, tomentose; inflorescences 3-10 cm long, tomentose, cymose; involucre turbinate, 2-3 mm long, 1.5-2 (2.5) mm wide, tomentose; flowers yellow, 3-4 mm long.---Infrequent on clay hills and limestone outcrops in w-central Utah from Utah and Juab cos. s. to n. Millard Co. Endemic. Jul-Sep.

VAR. LAXIFOLIUM (Torr. & Gray) Reveal. [*E. kingii* var. *l.* Torr. & Gray. *E. chrysocephalum* A.Gray. *E. l.* A.Nels. *E. ochrocephalum* var. *angustum* M.E. Jones. *E. b.* var. *pumilum* Stokes ex Jones. *E. medium* Rydb. *E. nudicaule* ssp. *a.* S.Stokes. *E. n.* ssp. *p.* S.Stokes.] Plants (0.5) 1-2 dm high; leaves linear to narrowly oblanceolate, (1.5) 3-7 cm long, 1.5-5 mm wide, tomentose below, floccose to glabrous above, the margin flat or revolute; stems (0.5) 1-2 dm long, tomentose to floccose or rarely glabrous; inflorescences capitate to subcapitate or umbellate, tomentose to floccose or rarely glabrous; involucre clustered, turbinate, 3-4 mm long, 2-3 mm wide, tomentose to glabrous; flowers yellow to cream, 2.5-3.5 mm long.---Common across n. Utah from desert ranges and valley floors up to 10,000 feet atop the Wasatch Plateau; se. Ida. and sw. Wyo. Jul-Sep.

This complex variant is now defined to contain two elements, which, when their extremes are viewed, are vastly different. The low, compact to nearly caespitose alpine (or clay-hills and flats) phase formally called var. *laxifolium* or *E. chrysocephalum* can be quickly distinguished from the mid-elevation (or clay-hills and flats, also of the lower elevations) phase normally called var. *pumilum*. However, in much of eastern Utah Co. and adjacent parts of Duchesne, Summit and Carbon cos., the two can not be distinguished except artificially on the bases of a capitate versus a subcapitate or umbellate inflorescence. As a result, the variant is defined to include both extremes.

VAR. WASATCHENSE (M.E. Jones) Reveal. [*E. w.* M.E. Jones.] Plants 3-5 dm high; leaves narrowly elliptic, 1.5-4 cm long, (3) 4-7 mm wide, tomentose below, floccose above, the margin flat, crenulate; stems 1-3 dm long, glabrous; inflorescences cymose, (8) 10-15 cm long, glabrous; involucre turbinate, 3-4 mm long, 2-2.5 mm wide; flowers white, 2-2.5 mm long.---In the mountains and along the w.

slope of the Wasatch Mts. from n. Sevier Co. n. to Davis Co. Endemic. Jul-Sep.

20. *E. SPATHULATUM* A.Gray. [*E. nudicaule* ssp. *ochroflorum* S. Stokes.] Erect to spreading herbaceous perennials 1.5-4 dm high, 1-4 (5) dm across; leaves lanceolate to narrowly elliptic, 1-4 (6) cm long, 3-10 mm wide, tomentose, the margin flat, the petiole 5-15 mm long; stems erect, 1-2 dm long, tomentose; inflorescences cymose, 3-10 cm long and wide, tomentose; involucre clustered, turbinate-campanulate, 2-3 (3.5) mm long, 2-2.5 (3) mm wide, tomentose, the 5 acute teeth 0.5-0.8 mm long; flowers cream to pale yellow, 2.5-3.5 mm long, glabrous, the tepals oblong; achenes brown, 3-3.5 mm long.---Low rolling clay hills in s. Sevier Valley of San Pete and Sevier cos., and in e. Millard and Beaver cos. s. to Iron Co. Endemic. Jul-Oct.

21. *E. LOGANUM* A.Nels. [*E. chrysocephalum* ssp. *l.* S.Stokes.] Spreading herbaceous perennials 1.5-3 dm high, 2-4 dm across; leaves oblanceolate to narrowly elliptic, 2-5 (7) cm long, 3-7 mm wide, tomentose, the margin flat, the petiole 1-2.5 (3) cm long; stems erect, 1-2.5 dm long, lanate to tomentose; inflorescences capitate; involucre clustered, turbinate, 3.5-4.5 mm long, 2.5-3 mm wide, floccose to tomentose, the 5 acute teeth 0.5-1 mm long; flowers cream to yellow, 2.5-3.5 (4) mm long, glabrous, the tepals oblong to obtuse; achenes brown, 3-3.5 mm long.---Clay bluffs and hills in Cache Valley, Cache Co. Endemic. May-Jul.

22. *E. CONTORTUM* Small ex Rydb. [*E. effusum* ssp. *c.* S.Stokes.] Low herbaceous perennials 5-8 (10) cm high, 8-25 cm across; leaves linear to linear-oblanceolate, (0.5) 1-2 cm long, 1.5-2 (2.5) mm wide, tomentose below, floccose above, the margin revolute, the petiole 1-2 mm long; stems erect, 2-6 cm long, floccose; inflorescences cymose, 1-3 cm long, 0.8-2 cm wide, floccose to glabrous; peduncles up to 1 cm long, erect, floccose to glabrous; involucre turbinate to turbinate-campanulate, 1.5-2 (2.5) mm long, 1-2 mm wide, glabrous, the 5 acute teeth 0.3-0.5 mm long; flowers yellow, 1.5-2 (2.5) mm long, glabrous, the tepals oblong to obovate; achenes brown, 2-2.5 mm long.---Low rolling clay hills of Grand Valley of eastern Grand Co. e. to Mesa Co., Colo., also reported from Garfield Co. May-Aug.

23. *E. VIRIDULUM* Reveal. Erect to spreading herbaceous perennials 1-3.5 dm high, 1-4 dm across; leaves linear to narrowly elliptic, 1-3 (4) cm long, 1-2 (5) mm wide, tomentose below, glabrous above, the margin revolute, the petiole 1-1.5 (2) mm long; stems erect, 5-12 cm long, glabrous and bright green; inflorescences dense, cymose, 3-15 cm long, 2-8 cm wide, glabrous; peduncles, when present, up to 2 mm long, erect, glabrous; involucre turbinate, 2-3 mm long, 1.5-2 mm wide, glabrous, the 5 acute teeth 0.4-0.6 mm long; flowers yellow, 1.5-2 mm long, glabrous, the tepals ovate-oblong, those of the inner whorl slightly narrower; achenes brown,

1.5 mm long.---Clay hills and flats in Duchesne and Uintah cos.; nw. Colo. Jul-Sep.

24. *E. EPHEDROIDES* Reveal. Erect herbaceous perennials 2-3.5 dm high, 2-3 (4) dm across; leaves lanceolate, 1.5-2.5 cm long, 2-3 mm wide, tomentose below, subglabrous to glabrous above, the margin flat, the petiole 5-10 mm long; stems erect, 1-2 dm long, glabrous; inflorescences narrowly cymose, strict, 1.5-2.5 dm long, 0.5-1.5 dm wide, glabrous; peduncles erect, 5-15 mm long at the lower nodes, shorter above or lacking entirely, glabrous; involucre turbinate, 2-2.5 mm long, 1-1.5 mm wide, glabrous, the 5 acute teeth 0.4-0.5 mm long; flowers white to pale-yellow, 2-2.5 mm long, glabrous, the tepals lanceolate; achenes brown, 2 mm long.---Infrequent on white shale outcrops in e. Uintah Co. s. of Bonanza; nw. Colo. Jul-Sep.

25. *E. HUMIVAGANS* Reveal. Spreading herbaceous perennials 2-3 dm high, 2-4 dm across; leaves oblanceolate, 1.5-3 cm long, 2-5 (7) mm wide, tomentose below, less so and greenish above, the margin flat, the petiole 5-10 (12) mm long; stems weakly erect, 8-15 cm long, glabrous; inflorescences cymose, 6-15 cm long, 3-10 cm wide, glabrous; involucre turbinate, 3-4 mm long, 2-2.5 mm wide, glabrous, the 5 acute teeth 0.5-0.7 mm long; flowers white, 3-3.5 mm long, glabrous, the tepals obovate; achenes light brown, 2.5-3 mm long.---Known only from low clay hills e. of Monticello, San Juan Co. Endemic. Jul-Sep.

26. *E. INTERMONTANUM* Reveal. Spreading herbaceous perennials 1.5-3 dm high, 1-3 dm across; leaves narrowly lanceolate, (2) 3-5 cm long, 2-4 mm wide, tomentose below, floccose to subglabrous above, the margin flat, the petiole 1-2 cm long; stems erect, 1-1.5 dm long, glabrous; inflorescences cymose, 2-10 cm long, (4) 8-20 cm wide, glabrous; involucre clustered, turbinate-campanulate, 2.5-3.5 (4) mm long, 2-3 (4) mm wide, glabrous, the 5 acute teeth 0.4-0.7 mm long; flowers white, 2-3 mm long, glabrous, the tepals obovate; achenes brown, 2.5-3 mm long.---Dry sandy-loam places atop the Roan Cliffs, Grand Co. Endemic. Jun-Aug.

A highly variable plant found in Colorado and northern New Mexico might occur in eastern Utah. This is *E. lonchophyllum* Torr. & Gray, and may be distinguished (usually) by its revolute leaves 2-15 (20) cm long, white flowers 2-4 mm long, glabrous stems and branches. It resembles *E. brevicaulis* in some aspects but would most likely "key" to *E. humivagans* or *E. intermontanum*.

27. *E. THOMPSONAE* S.Wats. Spreading herbaceous perennials 2-4 dm high and 2-5 dm across, or spreading subshrubs 3-5 dm high and 3-6 dm across; leaves oblong to oblanceolate or elliptic, (2) 3-4.5 (5) cm long, 8-15 mm wide, tomentose below, glabrous or nearly so above, the margin flat, the petiole 3-7 cm long; stems erect, 12-25 cm long, glabrous; inflorescences open, cymose, 1-3 dm long and wide, glabrous; involucre turbinate, 2-3 (3.5) mm long, 1-1.5 (2)

mm wide, glabrous, the 5 acute teeth 0.4-0.5 mm long; flowers yellow or white, 3-3.5 mm long, glabrous, the tepals oblong to obovate; achenes light brown to brown, 2.5-3 mm long.---Clay hills and flats in s. Washington and Kane cos.; n. Ariz. Jul-Nov.

VAR. THOMPSONAE. Flowers yellow.---Infrequent to rare on clay hills near Kanab, Kane Co.; s. and w. in Mohave Co. to w. of Pipe Springs, Ariz. Jul-Nov.

VAR. ALBIFLORUM Reveal. Flowers white.---Infrequent on clay hills near Hurricane, Washington Co. Endemic. Jul-Nov.

Near the east gate to Zion National Park at Springdale, this variety becomes subshrubby and resembles forms of *E. corymbosum* in general aspect, but differs on leaf features and pubescence. On nearby hills, "normal" var. *albiflorum* can be found, but caution must be used in this matter as the variant would most likely key to *E. corymbosum* in most treatments.

28. *E. OSTLUNDII* M.E. Jones. [*E. spathuliforme* Rydb. *E. tenellum* ssp. *o.* S.Stokes. *E. spathulatum* ssp. *s.* S.Stokes.] Spreading herbaceous perennials 2-3.5 (4) dm high, 1-3 dm across; leaves elliptic to spatulate, 1-3 cm long, 5-8 (10) mm wide, tomentose below, less so to floccose above, the margin flat, the petiole 1-2 cm long; stems erect, 8-15 cm long, glabrous; inflorescences open, cymose, 5-25 cm long, 5-15 cm wide, glabrous; peduncles, when present, up to 1 cm long, erect, glabrous; involucre turbinate to turbinate-campanulate, 2-2.5 mm long, 1.8-2 (2.2) mm wide, glabrous, the 5 acute teeth 0.5-0.8 mm long; flowers white, 1.5-2.3 mm long, glabrous, the tepals obovate, those of the inner whorl slightly narrower; achenes light brown, 2.5-3 mm long.---Pinyon-juniper covered clay hills and slopes in Piute and Sevier cos. mainly along the Sevier River. Endemic. (May) Jun-Sep.

29. *E. EREMICUM* Reveal. Spreading herbaceous perennials 2.5-4.5 dm high, 1-2.5 dm across; leaves ovate to rounded, 1.2-2 cm long, 1-1.7 cm wide, finely tomentose on both surfaces, the margin flat, the petiole 1-2.5 cm long; stems erect, 5-20 cm long, glabrous; inflorescences open, cymose, 12-25 cm long, 1-2 dm across, glabrous; involucre clustered or infrequently solitary on the same plant, turbinate, 2.5-4 mm long, 2-2.5 mm wide, glabrous, the 5 acute to rounded teeth 0.4-0.8 mm long; flowers white, 2.5-3 mm long, glabrous, the tepals obovate, those of the inner whorl slightly narrower; achenes light brown to brown, 3 mm long.---Clay and limestone rolling hills and flats in sw. Millard Co. e. of Garrison, e. of Robisons Ranch and near the Desert Range Experiment Station. Endemic. Jun-Sep.

30. *E. BATEMANII* M.E. Jones. Spreading herbaceous perennials (1) 1.5-3.5 (4) dm high, 1-2.5 dm across; leaves elliptic, (1) 1.5-3 cm long, 6-10 (12) mm wide, tomentose on both surface or slightly less so above and floccose, the margin flat, the petiole 8-20 mm long; stems erect, 1-2 dm long, glabrous; inflorescences cymose,

5-15 cm long and wide, glabrous; involucre solitary or clustered, turbinate, 2-4 mm long, 1.5-2.5 mm wide, glabrous, the 5 acute teeth 0.5-0.8 mm long; flowers white, 1.5-2.8 mm long, glabrous, the tepals obovate; achenes light brown to brown, 2.5-3 mm long. ---Clay hills and slopes of ne. Utah from Duchesne and Uintah cos. s. to Garfield Co.; e. into extreme w. Colo. Jun-Sep.

31. *E. CRONQUISTII* Reveal. Low spreading herbaceous perennials (0.7) 1-1.5 (2) dm high, 3-8 dm across; leaves elliptic, 0.5-2 cm long, 4-10 mm wide, tomentose below, subglabrous above, the margin crenulate, the petiole 3-8 mm long; stems erect or nearly so, 5-10 cm long, glabrous; inflorescences subcapitate to cymose, up to 7 cm long and wide, glabrous; involucre solitary or clustered, turbinate, 3 mm long, 2-2.5 mm wide, glabrous, the 5 acute teeth 0.6-1 mm long; flowers white, (1.5) 2-3 mm long, glabrous, the tepals slightly dimorphic, those of the outer whorl oblanceolate, those of the inner whorl narrowly oblanceolate and about half as wide; achenes light brown, 2-2.5 mm long. ---Known only from a single talus slope on Bull Mtn., Henry Mts., Garfield Co. Endemic. Jul-Sep.

32. *E. RACEMOSUM* Nutt. Tall erect herbaceous perennials 3-8 (10) dm high; leaves elliptic to ovate or oval, (1.5) 2-6 (10) cm long, 1-2.5 (3.5) cm wide, lanate to tomentose below, floccose to glabrate or glabrous above, the petiole (2) 3-10 (15) cm long; stems erect, 1-3 (5) per plant, (1) 1.5-2.5 (3) dm long, tomentose to floccose; inflorescences cymosely branched with the virgated branches bearing 5-20 or more racemosely arranged involucre, 1.5-5 dm long, divided (2) 3-7 (10) times, tomentose to floccose; peduncles, when present, erect and up to 4 cm long, tomentose to floccose; involucre turbinate-campanulate, (2) 3-5 mm long, (2) 2.5-4 mm wide, tomentose to floccose, the 5 acute 0.1-0.5 mm long; flowers white to greenish- or brownish-white with greenish to reddish midribs and bases, often becoming pink to rose in fruit, (2) 2.5-5 mm long, glabrous, the tepals oblong-oblanceolate; achenes light brown, 3-4 mm long. ---Common in various mid-elevation locations throughout the mountains and foothills of Utah except for the n-most portion; c. Nev. e. to w. and s. Colo., n. Ariz. and n. N.M. Jul-Oct.

Several minor phases can be recognized in this species throughout its range, and a few occur in Utah. The plants in Utah Co. northward to Salt Lake Co. are particularly distinct, but as the whole lot tends to blend from one extreme to another, it seems inappropriate to attempt to distinguish any facet of the species.

33. *E. ZIONIS* J.T. Howell. Suberect to erect herbaceous perennials 3-6 dm high, often leaning on other vegetation for support; leaves oblong-ovate to ovate, 2-4.5 cm long, 1.5-2.5 (3) cm wide, lanate to tomentose below, thinly floccose to glabrous above, the petiole 3-6 (8) cm long; stems \pm erect, 1-3 per plant, 1-2.5 dm long, often fistulose, glabrous and green; inflorescences narrow, cymosely branched with the virgated branches containing 8-15 race-

mosely arranged involucre, 2-4.5 dm long, divided 2-5 times, glabrous; involucre turbinate to turbinate-campanulate, 1.5-3 mm long, 1.5-2.5 mm wide, tomentose, the 5 rounded teeth 0.2-0.4 mm long; flowers white to greenish- or yellowish-white with greenish to reddish midribs and bases, 2-3.5 (4) mm long, glabrous, the tepals oblong; achenes light brown, 3-4 mm long.---Infrequent to rare in sandy soil in Zion National Park, Washington and Kane cos. Endemic. Sep-Nov.

To the south, on the rim of the Grand Canyon, a variant occurs. The var. *coccineum* J.T. Howell may be distinguished by its larger scarlet flowers and narrower leaves. An unusual glabrous plant which may be *E. racemosum* has been seen from south of Flagstaff, but its relationship to *E. zionis* (if any) has not yet been determined.

34. *E. GRAYI* REVEAL. Low pulvinate and cespitose herbaceous perennials forming mats up to 2 dm across; leaves narrowly oblanceolate to narrowly elliptic, 0.5-1.5 (2) cm long, 2-4 mm wide, white-tomentose below, thinly floccose or more commonly glabrous and green above, the margin crenulate, the petiole 2-5 mm long; stems scapose, 0.4-15 cm long, glabrous or sparsely floccose; inflorescences capitate; involucre congested, turbinate, 2-3 mm long, 2-2.5 mm wide, glabrous, the 5 acute teeth 0.4-0.7 mm long; flowers bright yellow, 1.5-2.5 mm long, glabrous, the tepals lanceolate; achenes brown, 2-2.5 mm long.---Alpine regions of n-central Utah from Mt. Nebo n. to the Alta area, and onward in very scattered locations to s. Box Elder Co., mostly above 10,000 feet elevation. Endemic. Jun-Sep.

Eriogonum grayi Reveal, *sp. nov.*--Plantae humiles compactae perennes crassas tegetes formantes; folia anguste oblanceolata vel anguste elliptica, 0.5-1.5 (2) cm longa, 2-4 mm lata, laminis subtus albo-tomentosis, supra subglabris vel glabris et viridibus, petiolis 2-5 mm longis; scapi erecti, 0.4-15 cm longi, glabri vel parce floccosi; involucre rigida, turbinata, 2-3 mm longa, 2-2.5 mm lata, glabra, 5-lobata; flores lutei, 1.5-2.5 mm longi, glabri, tepalis lanceolatis; achaenia 2-2.5 mm longa. Typus: UTAH: Salt Lake Co., Lake Blanche, 15 Aug 1947, Holmgren *et al.* 7121. Holotypus, UTC! Isotypus, UC!

This new species is what has been generally called *Eriogonum chrysocephalum* in northern Utah (but not elsewhere). Asa Gray first attempted to describe the species, but cited the earlier name *E. kingii* var. *laxifolium* as a synonym, thus making *E. chrysocephalum* merely a new name for the variant. The new species is clearly related to those species centering around *E. brevicaule*, and like so many of the species of Sec. Capitata, can be traced back to a mid- or low elevation species of the *E. brevicaule* group. Both *E. grayi* and *E. desertorum* can be so traced, with the first most likely coming from some phase of var. *brevicaule* with the second a modification of *E. brevicaule* var. *laxifolium*. It is difficult to always distinguish *E. grayi* from some facets of var. *laxifolium* that occur on the Wasatch Plateau, but the key should provide a

ready means of discrimination between the various Utah entities.

35. *E. NANUM* Reveal. Low pulvinate and cespitose herbaceous perennials forming mats up to 2 dm across; leaves broadly elliptic, 3-10 mm long, 2-4 (5) mm wide, white-tomentose below, subglabrous to glabrous and green above, the margin crenulate, the petiole 1-3 mm long; stems scapose, 6-12 cm long, glabrous; inflorescences capitate; involucre congested, turbinate, 1.5-2.5 mm long, 1-2 mm wide, glabrous, the 5 acute teeth 0.3-0.5 mm long; flowers greenish-white to pale yellowish-white, 2-3 mm long, the tepals lanceolate; achenes light brown to brown, 2-2.5 mm long.---Known only from the Willard Peak area of Box Elder Co. Endemic. Jul-Sep.

Eriogonum nanum Reveal, *sp. nov.*--Plantae humiles compactae perennes crassas tegetes formantes; folia late elliptica, 3-10 mm longa, 2-4 (5) mm lata, laminis subtus albo-tomentosis, supra subglabris vel glabris et viridibus, petiolis 1-3 mm longis; scapi erecti, 6-12 cm longi, glabri; involucre rigida, turbinate, 1.5-2.5 mm longa, 1-2 mm lata, glabra, 5-lobata; flores eburnei, 2-3 mm longi, glabri, tepalis lanceolatis; achaenia 2-2.5 mm longa. *Typus:* UTAH: Box Elder Co., on talus slopes and limestone outcrops south of Willard Peak, toward Ben Lomond Peak, on the ridge and adjacent slopes southeast of the radio tower above a small reservoir, at 9500 feet elevation, 31 Aug 1964, *Reveal & Holmgren 665*. *Holotypus*, US! *Isotypi*, ARIZ, BRY, CAS, DS, GH, KANS, MO, NY, OKL, OSC, RM, RSA, UC, UT, UTC, WTU, distributed as *E. chrysocephalum* A.Gray.

This new species has been known to me for some time, but always looked upon as a mere variant of *E. grayi*. However, attempts to discover what the origin of *E. nanum* might have had, it could not be traced to *E. grayi*, nor, for that matter, to any of the facets of *E. brevicaulis*. It is still impossible to assign a proposed origin of the new species, but current ideas seem to suggest that one might wish to look into some of the species which occur to the north and west with membranaceous involucre. However, this seems most unlikely based on the understanding of the species in the Sec. Capitata now at hand.

36. *E. DESERTORUM* (Maguire) R.J. Davis. [*E. chrysocephalum* ssp. *d.* Maguire.] Low cespitose herbaceous perennials forming small mats 0.7-1.8 (2) dm across; leaves elliptic to broadly elliptic, 1-2.5 (3) cm long, (3) 5-8 (9) mm wide, densely white-tomentose on both surfaces, the margin entire, the petiole 0.5-1.5 cm long; stems scapose, (2) 3-6 cm long, tomentose; inflorescences capitate; involucre congested, turbinate to turbinate-campanulate, 2.5-4 mm long, 2.5-3.5 mm wide, tomentose, the 5 (8) acute teeth 0.5-0.8 mm long; flowers bright yellow with greenish-yellow midribs and bases, becoming tinged with rose in some, 2.5-3 mm long, glabrous, the tepals lanceolate; achenes brown, 2.5-3 mm long.---Dry sagebrush slopes and hills in extreme nw. Utah in Tooele and Box Elder cos.; ne. Nev. and s-central Ida. Jun-Aug.

This species closely resembles the low elevation desert populations of *E. brevicaulis* var. *laxifolium* of western Utah; the two can

be separated with some difficulty in the key.

37. *E. PANGUICENSE* (M.E. Jones) Reveal. Low pulvinate to cespitose herbaceous perennials forming mats 0.5-2 dm across; leaves narrowly oblanceolate, 0.5-6 (7) cm long, 2-4 (5) mm wide, white-tomentose below, floccose to subglabrous and green above, the margin entire or crenulate, occasionally inrolled, the petiole 1-4 (8) mm long; stems scapose, 2-30 cm long, glabrous; inflorescences capitate; involucre congested, turbinate, (2) 2.5-3 mm long, 1.5-2.3 mm wide, glabrous, the 5 rounded teeth 0.3-0.5 mm long; flowers white, 2-3 mm long, glabrous, the tepals obovate to oblong-obovate; achenes light brown, 3-4 mm long.---Clay slopes and hills of s-central and sw. Utah from Sevier Co. s. to Washington and Kane cos. Endemic. Jun-Sep.

VAR. *PANGUICENSE*. [*E. pauciflorum* var. *p.* M.E. Jones. *E. spathulatum* var. *p.* S.Stokes.] Mats 0.5-1.3 (1.5) dm across; leaves 1.5-6 (7) cm long, the margin entire, on petioles 2-8 mm long; scapes 8-25 (30) cm long; flowers 2-2.5 mm long; achenes 3-3.5 mm long.---Infrequent on clay hills from Sevier Co. s. to Washington and Kane cos. Jun-Sep.

VAR. *ALPESTRE* (S.Stokes) Reveal. [*E. chrysocephalum* ssp. *a.* S. Stokes.] Mats 1-2 dm across; leaves 0.5-1.5 cm long, the margin mostly crenulate, on petioles 1-4 mm long; scapes 2-7 cm long; flowers (2) 2.5-3 mm long; achenes 3.5-4 mm long.---Whitish clay outcrops on the upper rim of Cedar Break and near the base of Brian Head, Iron Co. Jul-Sep.

38. *E. VILLIFLORUM* A.Gray. Loosely cespitose herbaceous perennials with 10-20 rosettes of leaves forming indistinct mats 1-6 cm across; leaves narrowly elliptic, 4-9 mm long, (0.9) 1-1.8 (2) mm wide, silky-tomentose on both surfaces, the margin often slightly thickened, the petiole short 0.5-0.8 mm long; stems scapose or nearly so, 2-5 (8) cm long, villous, prostrate; inflorescences subcapitate to cymose-umbellate, 5-12 mm across; peduncles, when present, less than 1.5 mm long, villous; involucre campanulate, 4-5 mm long, villous, the 6-10 lobes 2-3 mm long; flowers white, maturing rose or rustic, 3-4.5 mm long, densely pilose without, sparsely so within, the tepals oblanceolate to oblong; achenes light brown, 2.3-2.5 mm long, glabrous.---Dry gravelly or clay hills of w. Utah, from Millard Co. s. to Kane Co.; e. Nev. Apr-Jul.

39. *E. TUMULOSUM* (Barneby) Reveal. [*E. villiflorum* var. *t.* Barneby] Low cespitose pulvinate herbaceous perennials with several hundred rosettes of leaves forming rounded, hummock-like mats 1-4 dm across; leaves oblanceolate to elliptic, 3-4 mm long, 0.7-1 mm wide, silky-tomentose on both surfaces, the margin often slightly thickened, the petiole 0.4-0.7 mm long; stems scapose, 1-9 mm long, villous, erect; inflorescences capitate; involucre campanulate, 2-4 mm long, (4) 5-8 mm wide, villous, the 7-10 lobes 1.6-2.2 mm long; flowers white, maturing rose or rustic, 3-4 mm long, densely

pilose without, sparsely so within, the tepals oblong to oblong-ob lanceolate; achenes light brown, 2 mm long, glabrous.---Dry clay hills and flats, gravelly slopes and sandstone ledges of e. Utah in central Duchesne and in n. Emery cos. Endemic. May-Jul.

40. *E. ARETIOIDES* Barneby. Low caespitose pulvinate herbaceous perennials with 20-50 rosettes of leaves forming small low mounds 7-14 cm across; leaves oblanceolate, 1-3.5 mm long, 0.9-1.2 mm wide, silky-pilose, the margin thickened or revolute, the petiole 0; stems 0; inflorescences reduced to a single involucre; involucre campanulate, 2.8-3.2 mm long, 3-4 mm wide, villous, the 4 lobes 1-1.5 mm long; flowers yellow, 2-2.2 mm long, densely pilose without, glabrous within, the tepals lance-ovoid; achenes brown, 2 mm long, glabrous.---Rare and local in Red Canyon and near Widtsoe, Garfield Co. Endemic. May-Jul.

This buckwheat is one of the rarest in Utah and remains one of the most endangered as the heavy recreation use of the Bryce Canyon area increases.

41. *E. SHOCKLEYI* S.Wats. Low pulvinate herbaceous perennials forming flat to rounded mats 1-4 dm across; leaves oblanceolate to elliptic or spatulate, (2) 3-8 (12) mm long, 2-4 (6) mm wide, tomentose below, often slightly less so above, the margin plane to slightly thickened, the petiole 2-5 mm long; stems scapose, up to 3 cm long, floccose to tomentose, erect; inflorescences capitate; involucre congested, campanulate, (2) 2.5-5 (6) mm long, 3-6 (7) mm wide, floccose to tomentose, the 5-10 lanceolate lobes (0.5) 1-3 mm long; flowers white with reddish or rustid midribs, bases and margins, becoming rose to red or rustic with age, or yellow with greenish midribs and bases, 2.5-4 mm long, densely pilose without, glandular within, the tepals oblong to obovate; achenes light brown to brown, 2.5-3 mm long, pubescent.---Clay hills and flats in w. Utah and in e. Utah; e. Calif. e. to s. Ida. and w. Colo. and s. to n. Ariz. and nw. N.M. May-Jul.

VAR. *SHOCKLEYI*. [*E. pulvinatum* Small. *E. villiflorum* var. *candidum* M.E. Jones. *E. acaule* var. *s.* M.E. Jones. *E.s.* ssp. *c.* S. Stokes.] Mats 1-2.5 dm across; leaves elliptic, 2-6 mm long, 2-4 mm wide; stems up to 2 cm long, floccose to tomentose; involucre 2-3.5 mm long, the lobes 0.5-1.5 (2) mm long; flowers white or pale yellow to yellow, 2.5-4 mm long; achenes sparsely pubescent.---The common phase of the species in w. Utah; e. Calif. to s. Ida. and w. Utah. May-Jul.

VAR. *LONGILOBUM* (M.E. Jones) Reveal. [*E.l.* M.E. Jones. *E. acaule* var. *l.* M.E. Jones. *E.s.* ssp. *l.* S. Stokes.] Mats (1) 2-4 dm across; leaves oblanceolate to spatulate, (3) 5-8 (12) mm long, (2) 3-6 mm wide; stems up to 3 cm long, tomentose; involucre (3) 4-6 mm long, the lobes (1) 2-3 mm long; flowers white, 3-4 mm long; achenes densely pubescent.---The common phase of the species in e. Utah; w. Colo. s. to n. Ariz. and nw. N.M. May-Jul.

42. *E. OVALIFOLIUM* Nutt. Low matted puvinate to cespitose herbaceous perennials forming mats (0.5) 1-4 dm across; leaves oblanceolate to elliptic or spatulate, oblong to obovate or oval to round, 0.2-6 cm long, (1) 2-15 mm wide, tomentose on both surfaces or somewhat less so above, the margin flat, the petiole up to 1 dm long; stems scapose, 0.3-30 cm long, lanate to floccose; inflorescences capitate; involucre solitary or congested, turbinate to turbinate-campanulate, (2) 3.5-5 (6.5) mm long, 2-4 mm wide, tomentose to floccose, the 5 acute to rounded teeth up to 1 mm long; flowers white, cream or brownish maturing pinkish, rose, red, or purple, or yellowish to yellow, (2.5) 3-6 (7) mm long, glabrous, the tepals dimorphic, those of the outer whorl oval to orbicular, those of the inner whorl lanceolate to elliptic and somewhat longer; achenes light brown to brown, 2-3 mm long.---Widespread throughout much of the state from the low desert valleys to the high mountains of extreme w. and nw. Utah; sw. Can. and w. U.S. Apr-Aug.

VAR. *OVALIFOLIUM*. [*Eucycla o.* Nutt. *Eucycla purpurea* Nutt. *E. purpureum* Benth. in DC. *E.o.* var. *p.* Durand. *E. dichroanthum* Gand. *E.o.* var. *utahense* Gand. *E.o.* ssp. *p.* S.Stokes.] Mats 2.5-4 dm across; leaves mostly obovate to oval or rounded, 0.5-2 cm long, the petiole (3) 5-15 mm long; flowers white to cream or brownish, maturing pinkish to rose or purplish, 4-5 mm long.---Common in the state in the low and mid-elevations; w. U.S. and Can. Apr-Jul.

VAR. *MULTISCAPUM* Gand. [*E.o.* var. *celsum* A.Nels. *E. orthocaulon* Small. *E.o.* var. *orthocaulon* C.L. Hitchc.] Mats 2-4 dm across; leaves elliptic to spatulate or oblong, 3-6 cm long, the petiole 3-8 (10) cm long; flowers pale-yellow to yellow, 4-7 mm long.---Rather common in the n. half of the State in low and mid-elevations; sw. Wyo. and w. Colo. w. across Utah and Nev. into e. Calif. s. Ida. and se. Ore. Apr-Jun.

VAR. *NIVALE* (Canby in Cov.) M.E. Jones. [*E.n.* Canby in Cov. *E. rhodanthum* Nels. & Kenn. *E. roseiflorum* Gand. *E. eximium* Tidestr. *E.o.* ssp. *e.* S.Stokes.] Low cespitose mats 0.5-3 dm across; leaves mostly rounded, 2-8 mm long and wide, the petiole 1-8 mm long; stems 0.3-5 cm long; flowers white to cream, becoming rose to red with age, 2-3 mm long.---High mts. of w. and nw. Utah (Deep Creek and Raft River ranges) mostly above 8500 feet elevation; w. Utah w. to Sierra Nevada of Calif., n. through Ore. and Wash. to British Colum. Jul-Aug.

SUBGENUS OLIGOGONUM NUTT.

43. *E. UMBELLATUM* Torr. Low cespitose to pulvinate herbaceous perennials to erect or spreading subshrubs or shrubs up to 1 m high and across, the mats, when formed, up to 8 dm across; leaves oblong, elliptic, oval, spatulate, broadly obovate to suborbicular, 0.4-3 cm long, 0.4-3 cm wide, densely lanate to tomentose or glabrous on both surfaces, or frequently tomentose below and subglabrous to glabrous above, the margin flat or infrequently thickened,

the petiole 0.2-10 mm long; stems slender to stout, (3) 5-30 cm long, bractless about midlength, mostly tomentose to glabrous, inflorescences simple to compound umbellate or reduced and subcapitate to capitate, the rays usually floccose to glabrous; peduncles and rays similar and often one in the same, up to 7 cm long; involucre turbinate to campanulate, the tube 1-6 mm long, (1) 1.5-10 mm wide, thinly tomentose to slightly floccose or glabrous without, the (5) 6-10 (12) linear-lanceolate to oblong lobes 1-6 mm long, usually reflexed; flowers cream to yellow, variable in coloration, 2.5-10 mm long including the (0.7) 1.3-2 mm long stipe, glabrous, the tepals slightly dimorphic, mainly spatulate to obovate; achenes light brown to brown, 2-5 mm long, sparsely pubescent at the apex.---Widespread throughout most of the w. U.S. and sw. Can. May-Oct.

This species is highly variable and divided into more than 20 distinct variants. The nature of some of these entities is still being studied, and more will likely be suggested in the future.

KEY TO THE VARIETIES

- A. Primary branches of the inflorescences simple, not branched or bracteate in the middle, or if so, then flowers cream-colored and plants of n. Utah.
- B. Flowers bright yellow.
- C. Leaves tomentose below, floccose to glabrous above; common throughout the state. *var. umbellatum*
- CC. Leaves glabrous on both surfaces.
- D. Inflorescences umbellate to subcapitate, up to 3 cm long; leaves 1-2 cm long; plants up to 5 dm high; central and n. Utah. *var. aureum*
- DD. Inflorescences capitate or nearly so, up to 1 cm long; leaves 0.5-1.5 cm long; plants up to 1 dm high; alpine regions of n. and sw. Utah. *var. porteri*
- BB. Flowers cream to whitish or pale-yellow.
- C. Leaves thinly tomentose to tomentose below, floccose to subglabrous or rarely glabrous above, 1-2 (2.5) cm long; inflorescences umbellate to (rarely) compoundly umbellate; flowers pale-yellow, cream or whitish, 4-8 mm long; plants from suberect to erect woody caudex branches; n. and w. Utah. *var. dichrocephalum*
- CC. Leaves densely lanate below, thinly floccose to glabrous and olive-green to green above, (0.3) 0.5-2 (4) cm long; inflorescences umbellate; flowers cream, 3-6 mm long; plants from prostrate woody caudex branches; n Utah. *var. majus*
- AA. Primary branches of the inflorescences compoundly branched; leaves sparsely pubescent to nearly glabrous on both surfaces; flowers bright yellow, rarely cream (in Washington Co.), 6-7 mm long; tall herbaceous perennials, sometimes subshrubby; s. half of the states. *var. subaridum*

VAR. UMBELLATUM. [*E. lateum* Small ex Rydb. *E. rydbergii* Greene. *E. cupreum* Gand.] Low mat-forming perennials up to 6 dm across; leaves tomentose below, glabrous to floccose (or rarely tomentose) above; stems up to 3 dm long; flowers bright yellow, 4-7 mm long. ---Found throughout most of the state except the se. corner; Wash. e. to Mont. s. to central Oreg., n. Nev. and Utah and Colo. Jun-Sep.

As now defined, the variety is restricted to the northern half of the United States. The California element, formally referred to var. *umbellatum* is now called var. *nevadense* Gand. [*E. reclinatatum* Greene. *E.u.* var. *californicum* Gand.].

VAR. AUREUM (Gand.) Reveal. [*E. neglectum* Greene. *E. azaleastrum* Greene. *E. umbelliferum* Small. *E. marginale* Gand. *E.u.* var. *intectum* A.Nels. *E.u.* var. *umbelliferum* S.Stokes. *E.u.* var. *glabratum* S.Stokes.] Low mat-forming to slightly erect perennials up to 6 dm across; leaves glabrous (or nearly so) on both surfaces; stems up to 3 dm long; flowers bright yellow, 4-7 mm long. ---Restricted mainly to the mountains of central and n. Utah; w. Wyo. and w. Colo. w. across Utah and Nev. to ne. Calif., se. Ore. and s. Ida. Jun-Sep.

VAR. PORTERI (Small) S.Stokes. [*E.p.* Small.] Low caespitose matted perennials up to 4 dm across; leaves glabrous on both surfaces; stems up to 1 dm high; flowers bright yellow, 4-6 mm long. ---Alpine regions of Utah from Iron Co. n. to the Uinta Mts.; ne. Nev. and Rocky Mts. of Colo. Jul-Sep.

VAR. DICHROCEPHALUM Gand. [*E. aridum* Greene. *E.u.* ssp. *a.* S. Stokes. *E.u.* var. *a.* C.L. Hitchc.] Low mat-forming to slightly erect perennials up to 6 dm across; leaves thinly tomentose to tomentose below, floccose to subglabrous or rarely glabrous and greenish above; stems up to 3 dm long; flowers pale-yellow, cream or whitish, 4-8 mm long. ---Infrequent in the desert ranges and along the w. foothills of the Wasatch Front of w. and n. Utah.; sw. Mont., w. Wyo., s. Ida. and se. Ore. s. to central Nev. and se. Calif. Jun-Aug.

VAR. MAJUS Hook. [*E. subalpinum* Greene. *E.u.* var. *s.* M.E. Jones. *E.u.* ssp. *m.* Piper. *E.u.* ssp. *s.* S.Stokes. *E. heracleoides* var. *s.* R.J. Davis.] Low prostrate mat-forming perennials up to 8 dm across; leaves lanate to densely tomentose below, thingly floccose to glabrous and olive-green above; stems up to 4 dm long; flowers cream, 3-6 mm long. ---Common in the mountains of n. Utah; sw. Can. s. to Ore., Ida., n. Utah. and central Colo. Jun-Sep.

VAR. SUBARIDUM S.Stokes. [*E. biumbellatum* Rydb. *E. ferrissii* A.Nels. *E.u.* ssp. *f.* S.Stokes. *E.u.* ssp. *s.* Munz.] Erect to subshrubby perennials up to 6 dm across and 1 m high; leaves thinly floccose to glabrous on both surfaces; stems 0.5-2 dm long; flowers bright yellow or rarely cream-colored, 6-7 mm long. ---Restricted to the s. half of the state; extreme sw. Colo., s. Utah and n. Ariz. w. across s. Nev. to se. Calif. Jul-Oct.

44. *E. HERACLEOIDES* Nutt. [*E. gyrophyllum* Nutt. *E.h.* var. *minus* Benth. in DC. *E.h.* var. *multiceps* Gand. *E.h.* var. *utahense* Gand. *E.h.* var. *nydbergii* Gand.] Low spreading freely branching herbaceous perennials forming mats up to 6 dm across; leaves linear-oblongate to broadly oblanceolate, 2-5 cm long, 4-10 (15) mm wide, densely lanate to tomentose below, thinly floccose to glabrous above, the margin flat, the petiole 0.5-3 cm long; stems erect, slender to stoutish, 1-3 (4) dm long with a whorl of large foliar bracts about midlength, tomentose to floccose; inflorescences simple to compoundly umbellate, subcapitate in alpine forms, mostly open and up to 1 dm long and across, the rays tomentose to floccose; peduncles similar to the rays, up to 3 cm long, erect to slightly spreading, tomentose; involucre turbinate to campanulate, the tube 2-4.5 mm long, 2.5-5 (6) mm wide, tomentose, the reflexed lobes (2) 3-6 (7) mm long; flowers white to cream, 4-9 mm long including the 1.5-3 mm long stipe, glabrous, the tepals spatulate to oblong-ovate; achenes light to dark brown, (2) 3.5-5 mm long.--- Common in the foothills and mountains of n. Utah; sw. Can. s. to ne. Calif., e. across n. Nev. and Utah to nw. Colo., w. Wyo. and w. Mont. May-Aug.

In Utah, only the typical variety of the species is found. However, in the Pacific Northwest, two additional variants are found. One, the var. *angustifolium* (Nutt.) Torr. & Gray occurs from southern British Columbia southward through eastern Washington to north-eastern Oregon. A second variety, var. *leucophaeum* Reveal¹ has been known for some time under the name var. *minus*, but its type is merely a small plant of var. *heracleoides* and not worthy of a formal name. Douglas recognized this new variety as different from *E. heracleoides* and proposed the name used here at the species level on a specimen he collected in Oregon or Washington - "Very gravelly soils of the interior," as the specimen at Kew reads. It is felt now, that this entity can not be recognized as a distinct species, but should be maintained at the varietal level as its concept has (at least) since the 1850s.

45. *E. CAESPITOSUM* Nutt. [*E. andinum* Nutt. *E.c.* var. *alyssoides* Gand.] Low pulvinate to caespitose herbaceous perennials forming mats up to 4 dm across; leaves elliptic to obovate or oblong-spatulate to nearly oval, 2-10 (15) mm long, 1.5-4 (5) mm wide, tomentose on both surface to slightly less so to floccose above, the margin mostly flat, the petiole 0.5-4 mm long; stems scapose, \pm erect, (1) 3-8 (10) cm long, usually floccose to glabrous, without

¹*Eriogonum heracleoides* Nutt. var. *leucophaeum* Reveal, var. nov. A var. *heracleoides* caulibus sine bracteis differt. Leaves linear-oblongate, 1.5-3 (3.5) cm long, 2-5 mm wide, lanate to tomentose below, floccose above; stems without a whorl of foliaceous bracts about midlength.---TYPUS: WASHINGTON: Spokane Co., Along U.S. Highway 10-395, 0.3 mile northeast of Tyler, 10 miles southwest of Cheney, 19 June 1966, Holmgren & Reveal 2730. Holotypus, US! Isotypi, ARIZ, ASU, BRY, CAS, GH, MO, NY, OSC, RM, RSA, UC, UTC, WTU!

bracts even at the base of the involucre; inflorescences capitate; involucre campanulate, the tube 2-3.5 mm long, 3-5 mm wide, tomentose to floccose, the 6-9 reflexed lobes 2-3.5 mm long; flowers yellow, becoming reddish with age, 2.5-10 mm long including the 0.5-1 mm long stipe, pilose to villous without, the tepals + oblong to oblanceolate; achenes light brown to brown, (3.5) 4-5 mm long, with a glabrous to slightly pubescent beak.---Infrequent on scattered desert ranges of w. Utah from Tooele Co. s. to Washington Co.; e. Calif. and Ore. e. to w. Mont., w. Wyo. and nw. Colo. Apr-Jun.

46. E. JAMESII Benth. in DC. Low matted to robust and erect herbaceous perennials up to 4.5 dm high and 6 dm across; leaves oblanceolate to elliptic, (0.5) 1-3 cm long, 0.5-1.5 cm wide, tomentose below, floccose above, the margin mostly entire and flat, the petiole 0.5-5 cm long; stems erect, slender to stoutish, (3) 5-25 cm long, tomentose to floccose; inflorescences usually open, simple or compoundly umbellate, rarely highly reduced and subcapitate to capitate, up to 2 dm long, tomentose to floccose; involucre turbinate to campanulate, 3-7 mm long, 2.5-8 mm wide, tomentose to floccose, the 5-8 erect teeth up to 0.5 mm long; flowers yellow, (4) 5-8 mm long including the 0.7-2 mm long stipe, densely pilose without, the tepals dimorphic, those of the outer whorl lanceolate to elliptic, those of the inner whorl narrower and longer; achenes light brown to brown, 4-5 mm long, with a sparsely pubescent beak.---Relatively common, but scattered, in sw. Utah and mostly in pinon-juniper woodlands of e. Utah; Utah, Colo. and s. Wyo. s. into Ariz., N.M., w. Kans., w. and n. Tex. and ne. Mex. Jun-Oct.

In Utah only two varieties of this species occur. The typical variant, var. *jamesii*, has white to cream flowers, with entire leaf margins, and ranges from Colorado southward into eastern Arizona, most of New Mexico and the northern and western parts of Texas. A couple of related populations occur elsewhere. The var. *simplex* Gand which may be distinguished by its highly reduced (mostly simple) inflorescence occurs in southwestern Kansas, isolated from the remaining varieties of the species. Var. *undulatum* (Benth. in DC.) Stokes ex Jones is the common Mexican phase which just enters the United States in Texas and southeastern Arizona. The new variety, var. *wootonii* Reveal² is similar to var. *flavescens*, but

² *Eriogonum jamesii* Benth. in DC. var. *wootonii* Reveal, var. nov. A var. *flavescens* foliis late ellipticis, 3-5 cm longis, 1.5-3 cm latis, bracteis ellipticis, 2-4 cm longis, 0.7-1.8 cm latis differt. Mats up to 5 dm across; leaves broadly elliptic, 3-5 cm long, 1.5-3 cm wide, the margin entire; inflorescences divided 3-5 times, up to 2 dm long; bracts mostly narrowly elliptic, 2-4 cm long, 0.7-1.8 cm wide; involucre 3-6 mm long, 4-9 mm wide; flowers yellow, 4-7 (9) mm long.---TYPUS: NEW MEXICO: Lincoln Co., White Mountains, 7000 feet elevation, 11 Aug 1897, *Wooton 319*. Holotypus, US! Isotypi, G, GH, KSC, MO, ND-G, NMC, NY, P, UC, UMN!

differs in having consistently larger leaves and bracts, a more divided inflorescence, slightly larger flowers, and an isolated location, the new variety being restricted to the high mountains of Otero and Lincoln cos. The last variety, var. *rupicola*, is described below.

VAR. FLAVESCENS S. Wats. [*E. arcuatum* Greene. *E. bakeri* Greene. *E. vegetius* A.Nels. *E.j.* ssp. f. S.Stokes. *E.j.* ssp. b. S.Stokes. *E.j.* var. a. S.Stokes.] Mats up to 5 dm across; leaves mostly elliptic, 1-3 cm long, 0.5-1.5 cm wide, the margin entire; inflorescences divided 1-3 times, up to 2 dm long; bracts mostly narrowly elliptic, up to 2 cm long and 1 cm wide; involucre 3-7 mm long, 4-8 mm wide; flowers yellow, (4) 5-8 mm long.---In the mountains and foothills of e. Utah; se. Wyo., s. Colo. and n. N.M. w. into w. Colo. and n. Ariz. Jul-Oct.

VAR. RUPICOLA Reveal. Mats up to 6 dm across; leaves elliptic to broadly elliptic, 5-12 mm long, 5-8 mm wide, the margin entire or nearly so; inflorescences subcapitate (or rarely capitate) to umbellate, divided 1 time, up to 4 cm long; bracts narrowly elliptic, up to 10 mm long and 5 mm wide; involucre 3-5 mm long, 3-4 mm wide; flowers yellow, 4-5 mm long.---Rare on sandstone ledges and in adjacent reddish blow sand in Zion National Park, Washington and Kane cos. Endemic. Jul-Sep.

Eriogonum jamesii Benth. in DC. var. *rupicola* Reveal, var. nov. A var. *flavescens* foliis brevioribus, 5-12 mm longis, 5-8 mm latis, bracteis ad 10 mm longis et 5 mm latis, floribus 4-5 mm longis.---TYPUS: UTAH: Washington Co., Zion National Park, along Utah Highway 15, 4.9 miles west of the eastern entrance of the Park, on the Checkerboard Mesa at about 5200 feet elevation, 12 Aug 1972, Reveal & Reveal 2874. Holotypus, US! Isotypi, 19 duplicates to be distributed from US.

SUBGENUS PTEROGONUM (H. GROSS) REVEAL

47. *E. ALATUM* Torr. in Sitgr. [*E. triste* S.Wats. *E.a.* ssp. *t.* S.Stokes.] Tall erect monocarpic herbaceous perennials 5-15 dm high arising from a large chambered taproot; leaves linear-lanceolate to lanceolate or oblanceolate, 0.3-2 dm long, 0.3-1.5 cm wide, strigose above and below, becoming glabrous in most or only on the upper surface, the petiole 2-5 cm long, the cauline leaves narrower and shorter; stems erect, 3-10 dm long, strigose to nearly glabrous or even glabrous especially in fruit; inflorescences open paniculated cymes, 2-6 dm long, sparsely strigose to glabrous; peduncles erect, 0.5-3 cm long, sparsely strigose to glabrous; involucre turbinate to campanulate, 2-4 (4.5) mm long and wide, mostly strigose without, 5-lobed; flowers yellow to yellowish-green, 1.5-2.5 mm long in anthesis, 3-6 mm long in fruit and often turning reddish, glabrous, the tepals lanceolate; achenes yellowish- to greenish-brown, maturing reddish-brown, 5-9 mm long, 3-6 mm wide, glabrous, distinctly winged the entire length.---Rather common on sandy to sandy-loam soils in s. and e. Utah; e. Utah, Colo., se. Wyo.,

w. Neb. s. through w. Kans., w. Okl. and n. Tex., Ariz. and N.M. to w. Tex. and extreme n. Mex. Jun-Oct.

SUBGENUS GANYSMSA (S. WATS.) GREENE

48. *E. INFLATUM* Torr. & Gray. Erect annuals or first-year flowering perennials 1-10 dm high; leaves oblong-ovate to oblong or rounded to reniform, (0.5) 1-2.5 (3) cm long, (0.5) 1-2 (2.5) cm wide, short-hirsute on both surfaces, infrequently less so to villous or glabrate above, the margin entire or crisped-undulate, the petiole 2-6 cm long; stems usually fistulose or inflated, usually glabrous or merely pubescent at the base, (0.2) 1-4 dm long; inflorescences cymose, open, 0.5-5 dm long, 0.5-8 dm wide, the branches occasionally inflated, glabrous, with 3-5 branches at the first node; peduncles filiform to capillary, erect, 5-20 mm long, glabrous; involucre turbinate, 1-1.5 mm long, 1-1.8 mm wide, glabrous or with the lobes slightly glandular in some, 5-lobed; flowers yellow with reddish or greenish midribs and bases, (1) 2-2.5 (3) mm long, short-hirsute, the tepals lance-ovoid to ovoid; achenes light brown to brown, 2-2.5 mm long.---On clay hills and flats in s. and e. Utah; e. Calif., Nev., Utah, and w. Colo. s. to Mex. Mar-Oct.

VAR. *INFLATUM*. First-year flowering perennial (1) 2-10 dm high; stems fistulose, grayish.---Rather common across s. Utah and n. in e. Utah as far as s. Uintah Co. Mar-Oct.

VAR. *FUSIFORME* (Small) Reveal. [*E. f.* Small.] Strictly annual plants 1-3 dm high; stems strongly inflated, greenish.---Locally common to abundant on clay hills and flats in ne. Utah in Uintah and Duchesne cos. s. to Grand Co.; w. Colo. Mar-Jul.

49. *E. TRICHOPES* Torr. [*E. trichopodum* Torr. ex Benth. in DC. *E. trichopodum* var. *minus* Benth. in DC. *E. t.* ssp. *m.* S.Stokes.] Erect annuals 1-4.5 dm high; leaves basal, round-oblong to rounded, 1-2.5 (4) cm long, 1-2 (3) cm wide, hirsute, the margin entire or crenulate, the petiole 1-6 cm long; stems erect, usually slender, rarely slightly fistulose, glabrous or only minute pubescent at the base, 0.5-1.5 dm long; inflorescences densely paniculated cymes, 0.5-4 dm long and wide, the branches slender, glabrous, with numerous secondary branchlets at the lower nodes; peduncles capillary, \pm erect, 5-15 mm long, glabrous; involucre turbinate, 0.7-1 mm long, 0.6-0.9 mm wide, glabrous, 4-lobed; flowers yellowish to greenish-yellow, 1-2 (2.5) mm long, short-hirsute, the tepals lance-ovate; achenes light brown to brown, 1.5-2 mm long.---Clay hills and flats in Washington Co.; sw. Utah, s. Nev. and se. Calif. s. to n. Mex. and e. across most of Ariz. to s. N.M. Mar-Sep.

The distinction between *Eriogonum inflatum* and *E. trichopes* is often difficult to make. The immature, first-year flowering specimens of the first are often similar to those of the second. However, as the plants age, their differences become readily obvious and separation is possible.

50. *E. HOWELLIANUM* Reveal. Low erect or spreading herbaceous annuals 0.5-3 dm high; leaves basal, broadly elliptic to oval, 7-25 mm long, 5-20 mm wide, pilose-hirsutulous, the petiole 5-40 mm long; stems erect, slender, 3-10 cm long, glandular; inflorescences open and rounded, 0.5-2 dm long, 0.5-1.5 (2) dm wide, evenly scattered glandular throughout; peduncles slender, straight or curved, ascending to erect, 3-10 mm long, becoming slightly shorter above, sparsely glandular along the lower half of its length; involucre turbinate-campanulate, 1.3-2 mm long, 1-2 mm wide, glabrous, 5 (rarely 4) toothed; flowers yellow with reddish midribs, 1-1.5 (2) mm long, densely pilose, the tepals lanceolate; achenes brown, 1.5-1.8 mm long.---Rare and local on dry sandy to gravelly soil in low foothills of the desert ranges in w. Utah from Tooele Co. s. to Millard Co.; e. Nev. from Elko Co. s. to Lincoln and se. Nye cos. Jun-Sep.

Eriogonum howellianum Reveal, *sp. nov.* Herba annua, 0.5-3 dm alta; folia basi, laminis \pm ellipticis vel ovalis, 7-25 mm longis, 5-20 mm latis, pilosi-hirsutulosi, petiolis 5-40 mm longis; caules erecti, 3-10 cm longi, glandulosi; inflorescentiae 0.5-2 dm longae, 0.5-1.5 (2) dm latae, glandulosae; pedunculi \pm erecti, 3-10 mm longi, sparse glandulosi; involucre turbinate-campanulata, 1.3-2 mm longa, 1-2 mm lata, glabra, 5-lobata (raro 4-lobata); flores lutei, 1-1.5 (2) mm longi, pilosi, tepalis lanceolatis; achaenia infuscata, 1.5-1.8 mm longa.---TYPUS: UTAH: Millard Co., Along Utah Highway 21, 17 miles southeast of Garrison, on low limestone hills near the road, associated with *Artemisia Atriplex Oryzopsis*, at about 6200 feet elevation, 23 Jul 1965, Holmgren, Reveal & LaFrance 2248. Holotypus, US! Isotypi, ARIZ, BRY, CAS, DS, GH, KSC, MO, NY, OKL, OSC, RM, RSA, TEX, UC, UTC, WTU!

Eriogonum howellianum has been known since the 1890s but only as *E. glandulosum* (Nutt.) Nutt. ex Benth. in DC. In 1956, Howell published a paper on *E. glandulosum* and his concept followed that of other, earlier floristic workers in attributing this species to the plants found in eastern Nevada and western Utah. In 1969, his comments were followed in my own treatment of the genus where I suggested the type of *E. glandulosum* may have come from western Utah (a point later repeated in 1972 in the first volume of the Intermountain Flora). In Howell's 1956 paper, he proposed a var. *carneum*, then a poorly known taxon from the desert ranges of eastern California. By 1968, J.C. Beatley had rediscovered the variant and provided me with numerous specimens which showed this entity to be a distinct species, and such was then proposed (Reveal & Munz, 1968).

In the winter of 1972, I visited the Royal Botanic Gardens at Kew, and reviewed the type (actually an isotype) of *Eriogonum glandulosum*. Much to my surprise, the type proved to be what I had been calling *E. carneum*, and not what was then thought of as *E. glandulosum*. As a result of this discovery, a new species name was needed for the element long known as *E. glandulosum*, and *E. howellianum* is here proposed to honor John Thomas Howell of the California Academy of Sciences who first reviewed the species.

51. *E. FLEXUM* M.E. Jones. [*E. f.* var. *ferronis* M.E. Jones.] Erect herbaceous annuals (0.5) 1-3 dm high; leaves basal, orbicular to orbicular-rhombic, 0.5-2 cm long and wide, sparsely and minutely strigose when young on both surfaces, becoming glabrous with age, infrequently sparsely glandular on both surfaces in some, the petiole 1-4 cm long; stems erect, 3-7 cm long, minutely glandular; inflorescences erect or spreading, 0.5-2.5 dm long, glabrous except for scattered glands at the lower nodes; peduncles filiform, 1-3 cm long, flexed to an acute angle about 3/4 of the distance, glandular up to about the middle, otherwise glabrous; involucre broadly campanulate, composed of two whorls of 3 foliaceous lobes, these lanceolate, divided nearly to the base of the tube, those of the outer whorl wider and shorter than those of the inner whorl; flowers yellow, 1.5-2.5 mm long in anthesis, becoming 2.5-4 mm long in fruit, pilose without, the tepals lanceolate; achenes light brown, 2-2.5 mm long.---Dry clay hills and flats of e. Utah from Uintah Co. s. to Kane and San Juan cos.; e. to w. Colo. and s. to nw. N.M. and ne. Ariz. Apr-Jul.

52. *E. SALSUGINOSUM* (Nutt.) Hook. [*Stenogonum s.* Nutt.] Low spreading suberect herbaceous annuals 0.5-1 dm high and 0.5-4 dm across; leaves basal and cauline, the basal ones spatulate, (1) 2-4 cm long, (0.5) 1-2.5 cm wide, glabrous, the petiole 0.5-2 cm long, the cauline ones linear-lanceolate to oblanceolate, 0.5-4.5 cm long and 2-10 mm wide, glabrous, sessile; stems prostrate to suberect, 1-3 cm long, glabrous; inflorescences open, 0.5-2 dm long, glabrous; peduncles, when present, slender to filiform, up to 4 cm long, erect and straight, glabrous; involucre broadly campanulate, composed of two whorls of 3 foliaceous lobes, these lanceolate, divided nearly to the base of the tube, those of the outer whorl longer and narrower than those of the inner whorl; flowers yellow, 1.5-2.5 mm long in anthesis, becoming 2.5-3 mm long in fruit, pilose without, the tepals lanceolate; achenes light brown, 2-2.5 mm long.---Locally common on dry clay hills and flats in scattered locations in e. Utah from Uintah Co. s. to San Juan Co.; sw. Wyo. s. through extreme w. Colo. to nw. N.M., n. Ariz. and in Lincoln Co., Nev. Apr-Sep.

53. *E. GORDONII* Benth. in DC. [*E. trinervatum* Small.] Erect herbaceous annuals 1-4 (6) dm high; leaves basal, obovate to round or reniform, 1-5 cm long and wide, sparsely villous to hirsute on both surfaces, often becoming glabrous, the petiole 1-5 cm long; stems erect, 5-15 cm long, sparsely hispid at the base in some, otherwise glabrous, rarely sparsely glandular; inflorescences open to dense, 5-30 cm long, sparsely hispid or more commonly glabrous; peduncles slender, erect, 0.5-2 cm long, glabrous, rarely slightly hirsute or hispid near the base; involucre campanulate, 0.6-1.3 mm long, 0.8-1.5 mm wide, glabrous, the 5 teeth 0.2-0.4 mm long; flowers white with greenish- to reddish-brown midribs and bases, becoming pinkish to rose in fruit in some, 1-2.5 mm long, glabrous, the tepals oblong-ovate to oblong; achenes light brown to brown,

2-2.5 mm long, glabrous.---Mostly on clay hills and flats in e. and s. Utah; w. Neb. and s. Wyo. s. across e. Utah and w. Colo. to nw. N.M. and n.e. Ariz. Jun-Sep.

54. *E. DEFLEXUM* Torr. in Ives. Erect to spreading herbaceous annuals (0.5) 1-5 dm high; leaves basal, cordate to reniform or nearly orbicular, 1-2.5 (4) cm long, 2-4 (5) cm wide, white-tomentose below, floccose to subglabrous above, the petiole 1-7 cm long; stems slender, 3-20 cm long, glabrous; inflorescences erect or spreading, open to diffuse, 1-4.5 dm long, glabrous; peduncles usually lacking, or if present, up to 5 mm long, glabrous, strongly deflexed; involucre turbinate, 1.5-2 mm long, 1-1.5 mm wide, glabrous, the 5 acute teeth 0.2-0.5 mm long; flowers white with greenish to reddish midribs and bases, 1-2 mm long, glabrous, the tepals dimorphic, those of the outer whorl ovate to oblong, the base usually subcordate to \pm obtuse, those of the inner whorl lanceolate to narrowly ovate; achenes brown to dark brown, 1.5-2 (2.5) mm long.---In scattered locations in w. and s. Utah; e. and s. Calif. e. across Nev. to w. Utah, s. in s. Utah to nw. Mex. May-Oct.

VAR. *DEFLEXUM*. [E.d. f. *stenopetale* H.Gross.] Plants mostly 1-5 dm high; peduncles, when present, up to 5 mm long; involucre turbinate, mostly 2 mm long; flowers 2 mm long, the outer whorl of tepals mostly ovate with subcordate bases.---Mostly in s. Utah from Washington Co. e. to San Juan and Garfield cos., and in scattered places elsewhere in w. Utah; nw. Mex. n. to s. Calif., s. Nev. and s. Utah. May-Oct.

The typical phase of the species is that element which occurs mainly in the warm deserts of the Southwestern United States. It is found on varied sites (i.e., gypsum, volcanics, and sandstones) in this area, but gradually gives rise to var. *nevadense*, the typical phase of the Great Basin, along a broad line from Nye Co., Nevada to western Utah. The var. *nevadense* differs mainly in its flower construction, the tepals being narrower with \pm obtuse bases and more oblong margins.

VAR. *NEVADENSE* Reveal. Plants mostly 0.5-3 dm high; peduncles lacking; involucre turbinate, mostly 1.5 mm long; flowers mostly 1.5 mm long, the outer whorl of tepals mostly oblong with subcordate to obtusish bases.---Mostly in w. Utah in the Great Basin from Millard Co. s. to n. Washington Co.; w. Nev. to w. Utah. Jun-Aug.

Eriogonum deflexum Torr. in Ives var. *nevadense* Reveal, var. *nov.* A var. *deflexo* floribus 1.5 mm longis, tepalis oblongis, involucris 1.5 mm longis, pedunculis nullis.---TYPUS: NEVADA: Nye Co., near Lunar Crater, 4.2 miles south of U.S. Highway 6, on gravelly volcanic soil associated with *Ceratoides* at 5850 feet elevation, 18 Jul 1972, Reveal & Reveal 2785. Holotypus, US! Isotypi, to be distributed from US!

This phase of the species was discussed by me (Reveal, 1968a) under the name "Nevadan phase." It is restricted to the Great Basin portion of the Intermountain Region, and in Utah is found in the deserts of the western counties.

55. *E. HOOKERI* S.Wats. [*E. deflexum* ssp. *h.* S.Stokes. *E.d.* var. *gilvum* S.Stokes.] Erect herbaceous annuals 1-6 dm high; leaves basal, cordate to subreniform, (1) 2-5 cm long, 2-6 cm wide, tomentose on both surfaces or slightly less so above but still tomentose, the petiole 1-5 cm long; stems slender to stout, 0.5-3 cm long, glabrous; inflorescences spreading, subglobose to + flat-topped, up to 5 dm across, glabrous; peduncles lacking; involucre broadly campanulate to hemispheric, 1-2 mm long, 1.5-3 (3.5) mm wide, deflexed, glabrous, the 5 acute teeth 0.6-1.2 mm long; flowers yellow, becoming reddish-yellow in fruit, 1.5-2 mm long, glabrous, the tepals dimorphic, those of the outer whorl of tepals orbicular or hastate, those of the inner whorl oblong; achenes light brown, 2-2.5 mm long.---Infrequent, but often locally common, in scattered locations throughout most of Utah, but particularly common in n. Utah; e. Calif. e. across Nev. to sw. Wyo. and w. Colo., s. to n. Ariz. Jul-Oct.

56. *E. BRACHYPODUM* Torr. & Gray. [*E. parryi* A.Gray. *E. deflexum* var. *b.* Munz. *E.d.* ssp. *b.* S.Stokes. *E.d.* ssp. *p.* S.Stokes.] Low spreading to erect herbaceous annuals 0.5-3 (4) dm high; leaves basal, orbicular to cordate, 1-3 (4) cm long, (1.5) 2-4 (5) cm wide, densely tomentose below, tomentose to subglabrous and green above, the petiole 1-4 cm long; stems slender to stout, 2-7 cm long, glandular; inflorescences horizontal in low, flat-topped crowns, or spreading and forming more open, subglobose crowns, the branches glandular; peduncles slender to stoutish, up to 15 mm long, deflexed, glandular; involucre turbinate to campanulate, 1-2.5 mm long, 1.5-2.5 mm wide, glandular, the 5 acute teeth 0.4-1 mm long; flowers white to reddish, 1-2.5 mm long, glabrous, the tepals dimorphic, those of the outer whorl ovate to oblong with cordate to auriculate bases, those of the inner whorl oblanceolate; achenes brown to blackish-brown, 1.5-2 mm long.---Restricted in Utah to Washington Co.; w. Nev. and e. Calif. e. across s. Nev. to sw. Utah and nw. Ariz. Mar-Oct.

57. *E. INSIGNE* S.Wats. [*E. exaltatum* M.E. Jones. *E.d.* var. *i.* M.E. Jones. *E.d.* ssp. *i.* S.Stokes. *E.d.* ssp. *e.* S.Stokes.] Tall erect herbaceous annuals (0.5) 3-10 dm high; leaves basal, subcordate to orbicular, (1.5) 2-5 (8) cm long and wide, tomentose below, floccose to subglabrous and greenish above, the petiole 1-10 cm long; stems stout, (0.2) 2-20 cm long, glabrous; inflorescences narrow, strict, (0.5) 1-8 dm long, glabrous, the branches long and whip-like with racemously arranged involucre at the tips; peduncles erect, 0-2 mm long, glabrous; involucre turbinate, 2-2.5 (3) mm long, 1.5-2.5 mm wide, glabrous, the 5 acute teeth 0.5-1 mm long; flowers white with greenish to reddish midribs and bases, 1.5-2 mm long, glabrous, the tepals dimorphic, those of the outer whorl oblong with cordate bases, those of the inner whorl oblanceolate; achenes dark brown to blackish, 2-2.5 mm long.---Rare, sandy soil in Washington Co. and perhaps to be found in Iron Co.; s. Calif. e. across s. Nev. to nw. Ariz. and sw. Utah. May-Oct.

58. *E. SCABRELLUM* Reveal. Erect and spreading herbaceous annuals 1-5 dm high; leaves basal, cordate, 1-3 cm long and wide, densely tomentose below, floccose above, the margin crisped and wavy, the petiole 1-4 cm long; stems slender, 5-15 cm long, sparsely to rather densely tomentose, scabrellous throughout; inflorescences + flat-topped, 0.5-4 dm high and across, the branches lightly to sparsely floccose, becoming less obvious with age, scabrellous throughout; peduncles lacking; involucre turbinate, 1.5-2.5 mm long, 1.5-2 mm wide, horizontally arranged on the branches, becoming somewhat deflexed with age, arising from the bracts along the edge of the branch, the tube scabrellous, the 5 acute teeth 0.3-0.8 mm long; flowers white to pink or rose to red, 1-1.5 mm long, pustulose, the tepals dimorphic, those of the outer whorl obovate with obtuse bases, those of the inner whorl ovate; achenes light brown, 2 mm long.---Rare and locally common, on clay hills and flats in e. Utah from Grand Co. s. to San Juan and Kane cos.; w. Colo. Jul-Oct.

59. *E. CERNUUM* Nutt. Low to high, spreading to erect herbaceous annuals 0.5-6 dm high; leaves basal or sheathing up the stems, ovate to orbicular, (0.5) 1-2 (2.5) cm long and wide, densely tomentose below, tomentose to floccose or subglabrous and greenish above, the petiole 1-4 cm long; stems slender, 0.3-2 dm long, glabrous; inflorescences open, erect or spreading, 0.5-5 dm high and up to 4 dm across, the branches glabrous and often glaucous; peduncles lacking or present, slender, cernuous, spreading or ascending, 1-25 mm long, glabrous; involucre turbinate, (1) 1.5-2 mm long, 1-1.5 mm wide, glabrous, the 5 acute teeth 0.2-0.7 mm long; flowers white to pinkish with greenish to reddish midribs and bases, 1-2 mm long, glabrous, the tepals dimorphic, those of the outer whorl panduriform with crisped or slightly wavy margins, those of the inner whorl obovate; achenes light brown to brown, 1.5-2 mm long.---Common throughout much of Utah; w. Can. s. to Calif., Ariz., and N.M. Jun-Oct.

VAR. *CERNUUM*. [*E.c.* var. *tenue* Torr. & Gray. *E.c.* var. *umbraticum* Eastw. *E.c.* ssp. *t.* S.Stokes.] Involucres with peduncles 1-25 mm long throughout.---Common in various habitats throughout much of Utah; range of the species. Jun-Oct.

VAR. *VIMINALE* (S.Stokes) Reveal in Munz. [*E.c.* ssp. *v.* S.Stokes.] Involucres sessile on the branches throughout.---Infrequent on desert valley floors and foothills of w. Utah; ne. Calif. and se. Ore. e. across Nev. to w. Utah. Jul-Sep.

This particular species can be confused with *Eriogonum deflexum* if the nature of the flowers is not carefully checked. While the overall habit of the two plants is strikingly different, without prior knowledge, one will often key var. *nevadense* to *E. cernuum*. If in doubt, check to see if the involucre is peduncled (if so, then likely var. *cernuum*!) or if the flowers have crisped or wavy margins - a feature of *E. cernuum* only. The stems of *E. deflexum* are usually greenish, whereas, those of *E. cernuum* are usually gray.

60. *E. NUTANS* Torr. & Gray. [*E. cernuum* var. *purpurascens* Torr. & Gray. *E. rubiflorum* M.E. Jones. *E. deflexum* ssp. *ultrum* S.Stokes.] Erect to spreading herbaceous annuals 5-30 cm high; leaves basal, round to broadly reniform, 5-25 mm long and wide, densely white tomentose below, floccose to subglabrous and greenish-brown above, the petiole 5-25 mm long; stems slender, 3-15 cm long, glandular and often reddish; inflorescences open to diffuse, spreading, 5-20 cm long, up to 3 dm across, glandular throughout; peduncles slender, curving downward, 3-10 mm long, glandular; involucre campanulate, 2-3 mm long, 2-3.5 mm wide, glandular, the 5 acute teeth 0.3-0.9 mm long; flowers white to rose or red, with a reddish to reddish-brown midrib and base, 2-3 mm long, essentially glabrous without, the tepals dimorphic, those of the outer whorl oblong to oval with emarginated apices, those of the inner whorl oblanceolate; achenes brown, 1.7-2 mm long.---Rare and infrequent in scattered locations in n. Utah, from Tooele Co. s. to Sevier Co. and e. to Carbon Co., on sandy to loam soils; w. Nev. and se. Ore. e. to Utah. May-Sep.

This species is rare in most of its known locations, often known from but a single plant! Infrequently, a local population may be composed of several individuals, but even then the plants are usually scattered and only rarely is this plant weedy like other members of this group of annuals. A distinct variety, var. *glabratum* Reveal is found in Elko Co., Nevada. It differs from the typical phase in being glabrous throughout - to date it is not known to be in our area.

61. *E. THOMASII* Torr. [*E. minutiflorum* S.Wats.] Low spreading herbaceous annuals 0.5-3 dm high; leaves basal, round to round-reniform, 5-20 mm long and wide, densely tomentose below, floccose to glabrate above, the petiole 5-30 mm long; stems slender, 2-10 cm long, glabrous except for a few scattered glands near the base in some; inflorescences spreading, open to diffuse, 0.5-2.5 dm long and across, glabrous; peduncles spreading, capillare, 5-20 mm long, glabrous; involucre turbinate-campanulate, 0.6-1.2 mm long, 0.7-1.3 mm wide, glabrous, the 5 acute teeth 0.2-0.4 mm long; flowers yellow and 0.8-1 mm long at anthesis, becoming white to rose and 1.2-2 mm long in fruit, short-hispidulous without, the tepals dimorphic, those of the outer whorl plane in early anthesis but soon becoming saccate-dilated on each side of the cordate base, the inflated area often white to pink, those of the inner whorl spatulate and often as long to slightly longer than the outer whorl; achenes brown to dark brown, 0.8-1 mm long.---Infrequent in sandy soil in Washington Co.; se. Calif. and Baja Calif. e. to w. Ariz. and sw. Utah. Mar-Jun.

62. *E. PUSILLUM* Torr. & Gray. [*E. reniforme* ssp. *p.* S.Stokes.] Spreading herbaceous annuals 0.5-3 dm high; leaves basal, oblong-ovate to rounded, 0.5-2 (3) cm long, 0.4-2 (2.5) cm wide, densely tomentose below, floccose to subglabrous and greenish-yellow above, the hairs infrequently glandular, the petiole 1-3 cm long; stems slender, 1-8 cm long, glabrous except for scattered glands at the

base in some; inflorescences open, spreading, 0.5-2.5 dm long and across, glabrous; peduncles slender, 1-3.5 (4) cm long, spreading to ascending, glabrous; involucre broadly turbinate to campanulate, 1-1.5 (1.7) mm long, 1.5-3 mm wide, glandular without, the 5 acute to rounded teeth 0.4-0.7 mm long; flowers yellow and 1-1.7 mm long in anthesis, becoming reddish-yellow and 2-2.5 mm long in fruit, glandular without, the tepals dimorphic, those of the outer whorl oblong-elliptic to obovate, those of the inner whorl oblong; achenes dark brown, 0.6-0.8 mm long.---Infrequent, on sandy soils in Washington Co.; s. Calif. n. to se. Ore. and sw. Ida., e. across s. Nev. to sw. Utah and w. Ariz. Mar-Jul.

This species is closely related to *E. reniforme* Torr. & Frém. which approaches southwestern Utah in Clark Co., Nevada. It differs from *E. pusillum* in having glabrous involucre.

63. *E. WETHERILLII* Eastw. [*E. sessile* Stokes ex Jones. *E. filiforme* L.O. Will.] Low spreading herbaceous annuals 0.5-2.5 dm high; leaves basal, oblong to orbicular, (0.5) 1-4 cm long, (0.5) 1-3 cm wide, densely tomentose below, floccose to subglabrous above, the petiole 1-5 cm long; stems slender, 1-5 cm long, glabrous except for villous bases in most; inflorescences compact and densely branched, 0.5-2 dm high, up to 4 dm across, the numerous branches becoming dark red with age, glabrous; peduncles filiform, erect, (3) 5-10 mm long, becoming shorter or lacking above in some, glabrous; involucre turbinate, (0.3) 0.5-1 mm long and wide, the 4 acute teeth up to 0.4 mm long; flowers yellow to red, 0.6-1.2 mm long in anthesis, becoming pinkish to rose or red and 1-1.5 mm long in fruit, glabrous, the tepals elliptic to obovate; achenes brown to black, 0.6-1 mm long.---Common in deep sandy soil in se. Utah from Grand and Emery cos. s. to Kane and San Juan cos.; w. Colo., nw. N.M. and n. Ariz. Apr-Sep.

64. *E. SUBRENIFORME* S.Wats. [*E. filicaule* S.Stokes.] Tall to slight spreading, erect herbaceous annuals 0.5-4 (6) dm high; leaves basal, orbicular to reniform, (0.5) 1-3.5 cm long, (0.5) 1-4 cm wide, tomentose below, hirsute to floccose or glabrous above, the petiole (1) 2-6 cm long; stems slender to stoutish, 2-15 (20) cm long, glabrous except for the hispid bases; inflorescences open to + diffuse, 0.5-4 dm long, up to 5 dm across, glabrous; peduncles filiform, 0.5-2.5 cm long, glabrous; involucre turbinate, 0.5-1 mm long, 0.6-0.9 mm wide, glabrous, the 5 acute teeth 0.2-0.4 mm long; flowers white to rose, 0.8-2 mm long, glabrous or sparsely hirsute without, the tepals lanceolate to spatulate or elliptic to ovate; achenes light brown, 1.7-2 mm long.---Infrequent and locally common on clay hills and slopes in s. Utah, from Washington Co. e. to San Juan Co. and n. to Garfield Co.; n. Ariz. and nw. N.M. Apr-Aug.

A related species, *Eriogonum viscidulum* J.T. Howell, known only from sandy hills near Bunkerville, Clark Co., Nevada, may be eventually found in Utah. It has viscid stems and branches and yellow

flowers 1.3-2 mm long. This annual may be expected to occur in the Virgin Narrows area of Washington Co.

65. *E. PHARNACEOIDES* Torr. in Sitgr. Erect herbaceous annuals 1-2 dm high; leaves basal and cauline, the basal ones linear-lanceolate to linear-ob lanceolate, 1-3 (4) cm long, 1-2.5 (4) mm wide, lanate below, villous and greenish above, the petiole 1-5 mm long, the cauline ones linear, 0.5-2 cm long, 0.5-2 mm wide, tomentose below, thinly villous to glabrous above, sessile; stems erect, villous, leafy; inflorescences open, 0.5-1.5 dm long and wide, the branches villous throughout; peduncles slender, erect or nearly so, (1) 2-5 cm long, villous to glabrous; involucre campanulate, the tube 1-2 mm long with 5 + erect, lanceolate lobes 1-3 mm long, villous; flowers yellow, 1-3 mm long, glabrous, the tepals dimorphic, those of the outer whorl oblong-ovate with a large saccate base on each side of the truncate to cordate base, those of the inner whorl linear-oblong; achenes brown, 1.8-2 mm long.---Rare, restricted to scattered desert ranges in w. Utah, known from Millard and Beaver cos.; Ariz. and sw. N.M., and in Lincoln Co., Nev. Aug-Oct.

The element discussed here is not representative of typical *Eriogonum pharnaceoides*, but represents an undescribed new variety. To date, however, this taxon is known only from a small number of specimens, all collected more than thirty years ago, and the total number of sheets is less than five. In August of 1972, I attempted to rediscover this plant in the Deer Lodge area of eastern Lincoln Co., Nevada. Unfortunately, since the early 1930s when the specimens in this area were made, the country roads have been badly eroded and essentially gone. While it was impossible to work a four-wheel drive truck into the area, I walked into the general region where Deer Lodge once existed, but could not find the annual. Attempts will be made to rediscover the plant in western Utah, hopefully in the fall of 1973, and enough material obtained to make a good type collection. The new variety differs from the typical phase of the species in having small yellow flowers, and is rather isolated from it. Other details will have to be determined with newer material.

66. *E. MACULATUM* Heller. [*E. angulosum* var. *m.* Jeps. *E.a.* ssp. *m.* S.Stokes.] Low spreading herbaceous annuals 1-2 (3) dm high; leaves basal and cauline, the basal ones lanceolate to obovate, 1-3 (4) cm long, 1-1.5 (2) cm wide, tomentose below, floccose to glabrate above, the margin entire or crisped and slightly revolute in some, the petiole 0.5-1 cm long, the cauline ones lanceolate to ob lanceolate, 0.5-2 cm long, 3-10 mm wide, similar to the basal leaves, sessile; stems slender, 2-8 cm long, mostly smooth or faintly angled in some, tomentose to floccose; inflorescences mostly open, spreading, 0.4-2.5 dm high and up to 3 dm across, tomentose to floccose; peduncles filiform, spreading, (5) 10-30 mm long, often glandular-puberulent or glabrous; involucre campanulate, 1-1.5 (2) mm long, 1.5-3 (3.5) mm wide, glandular-puberulent without, the 5 acute to rounded teeth 0.2-0.5 mm long; flowers white to yellow or pink to red with a large conspicuous rose to purple midrib, 1-2.5 mm long,

glandular-puberulent without, the tepals dimorphic, those of the outer whorl elliptic to roundish or obovate with an inflated area at the base and the middle with the sides incurved below, those of the inner whorl lanceolate to obtuse and extending beyond the apex of the outer whorl of tepals; achenes light brown, 1-1.5 mm long. ---Rather common in scattered locations on the w. deserts of w. Utah; s. and e. Calif. n. to s. Wash., e. into Ida., w. Utah and w. Ariz. Apr-Nov.

SUBGENUS OREGONIUM (S. WATS.) GREENE

67. *E. DAVIDSONII* Greene. [*E. baileyi* var. *d.* M.E. Jones. *E. juncinellum* Gand. *E. molestum* var. *d.* Jeps. *E. vimineum* ssp. *f.* S. Stokes. *E.v.* var. *d.* S.Stokes.] Rather tall, erect herbaceous annuals 1-2 dm high; leaves basal, mostly round to reniform, 1-2 cm long and wide, densely white-tomentose below, floccose to glabrate above, the petiole 1-3 cm long; stems erect, slender, 0.5-1 dm long, glabrous; inflorescences rather strict, erect, 0.5-1.5 dm long, up to 1 dm wide, glabrous; involucre cylindrical-turbinate, (2.5) 3-4 (5) mm long, 1-2 mm wide, glabrous, the 5 acute teeth 0.2-0.4 mm long; flowers white to pink, 1.5-2 mm long, glabrous, the tepals oblong-obovate to oblong, the inner whorl of tepals slightly narrower than those of the outer whorl; achenes brown, 2 mm long. ---Rare on sandy soil in s. Utah, Washington and Kane cos.; n. Ariz. and sw. Utah w. to n. Baja Calif. and s. Calif. Jun-Sep.

In Utah, this plant has been variously called *Eriogonum vimineum* or *E. juncinellum*. Only recently, however, has the name *E. davidsonii* been applied to the Utah plants (Reveal & Munz, 1968). In 1968, I placed *E. molestum* under *E. nudum* var. *pauciflorum* as a synonym, but field work in southern California in the summer of 1972 has shown this to be an error. *Eriogonum molestum* is a good species and an annual, closely related to *E. davidsonii*, but as the two occur together with no signs of intergradation, I am proposing they remain distinct species.

68. *E. NIDULARIUM* Cov. [*E. vimineum* ssp. *n.* S.Stokes.] Low to weakly erect herbaceous annuals (0.5) 1-3 dm high; leaves basal, rounded or nearly so, 0.5-2 cm long and wide, tomentose below, tomentose to floccose or rarely glabrate above, the petiole 1-3 cm long; stems spreading, 3-8 cm long, floccose; inflorescences dense, forming compact masses of numerous floccose branches 3-28 cm long, the tips of the branches often curving inwardly; involucre turbinate, 1 mm long, 0.5-0.7 mm wide, floccose, scattered along the branches and closely appressed to the stem, the 5 acute teeth 0.2-0.4 mm long; flowers yellow to reddish-yellow, 1.5-2 (3) mm long, glabrous, the tepals dimorphic, those of the outer whorl broadly fan-shaped, those of the inner whorl narrower and remaining erect; achenes brown, 1 mm long. ---Locally common but in scattered locations in the deserts of w. Utah; s. Calif. e. across s. Nev. to w. Utah and Ariz., n. in e. Calif. and w. Nev. to se. Ore. and sw. Ida. Apr-Oct.

69. E. PALMERIANUM Reveal in Munz. [*E. plumatella* var. *palmeri* Torr. & Gray. *E. baileyi* var. *tomentosum* S.Wats.] Low spreading herbaceous annuals 1-3 dm high; leaves basal, suborbicular to cordate, 0.5-1.5 cm long, 0.5-2 cm wide, densely tomentose below, less so to glabrate above, the petiole 1-4 cm long; stems spreading, 3-8 cm long, floccose to tomentose; inflorescences open, forming loose spreading masses of few floccose to tomentose branches, 0.5-2.5 dm long, up to 3 dm across; involucre campanulate, 1.5-2 mm long, floccose to tomentose, only a few scattered along the branches and closely appressed to the stem, the 5 acute teeth 0.4-0.7 mm long; flowers white to pink, 1.5-2 mm long, glabrous, the tepals slightly dimorphic, those of the outer whorl of tepals narrowly fan-shaped, those of the inner whorl slightly narrower and erect; achenes brown, 1.5-1.8 mm long.---Locally common in scattered locations in w. and s. Utah mainly in the desert regions or in pinyon-juniper woodlands; sw. Colo. and extreme w. N.M. w. across Ariz. and s. Nev. to s. and e. Calif. Jun-Oct.

70. E. POLYCLADON Benth. in DC. [*E. vimineum* ssp. *p.* S.Stokes.] Erect herbaceous annuals 1-6 dm high; leaves cauline, narrowly oblanceolate to broadly elliptic, 1-3 cm long, 0.5-2 cm wide, densely tomentose below, only slightly less so above, the petiole 3-15 mm long; stems erect, slender, 1-3 dm long, tomentose; inflorescences narrow, strict, 1-5 dm long, the erect branches tomentose; involucre turbinate, 1.5-2.5 mm long, 1-1.5 mm wide, tomentose or rarely glabrous without, scattered along the upper branches and appressed to the stem, the 5 acute teeth 0.2-0.5 mm long; flowers white to pink, 1.5-2 mm long, glabrous, the tepals dimorphic, those of the outer whorl broadly fan-shaped and becoming strongly reflexed outwardly, those of the inner whorl narrower and remaining erect; achenes dark brown, 1-1.3 mm long.---Rare, but often locally abundant, on sandy soil in Washington and Kane cos.; Ariz. and N. M. s. through w. Tex. to Mex. Jul-Oct.

This southern species just enters Utah and is currently known from only three sites in the southern part of the state.

71. E. DIVARICATUM Hook. Low spreading herbaceous annuals 1-2 (3) dm high; leaves basal and cauline, the basal ones elliptic-oblong to orbicular, 1-3 cm long, 1-2 cm wide, puberulent to short pilose on both surfaces, the petiole 2-4 cm long, the cauline ones similar but becoming gradually reduced in size above; stems spreading to prostrate or decumbent, 3-5 cm long, puberulent, leafy; inflorescences spreading, 0.5-2.5 dm long, puberulent; involucre turbinate, 1-2 mm long, 0.7-1.2 mm wide, pilose, the 5 lanceolate lobes 0.7-1.8 mm long, dividing the tube nearly to the base; flowers yellowish, 1.5-2 mm long, hispidulous or glandular without, the tepals mostly oblong, those of the inner whorl only slightly narrower; achenes light brown, 1.5-1.8 mm long.---In scattered locations, often on heavy gumbo clay slopes or flats in e. Utah from Uintah Co. s. to Kane and San Juan cos., and in isolated locations

as in Sevier Co. and Lincoln Co., Nev.; sw. Wyo. s. through e. Utah and w. Colo. to nw. N.M. and n. Ariz. Jun-Sep.

72. *E. PUBERULUM* S.Wats. [*E.p.* var. *venosum* S.Stokes.] Low spreading herbaceous annuals 0.5-3 dm high; leaves basal, obovate to rounded, 0.5-1.5 cm long and wide, sparsely villous on both surfaces, the petiole 0.5-2 cm long; stems erect or spreading, 3-8 cm long, silky-puberulent; inflorescences spreading, 0.5-2.5 dm long, silky-puberulent, often with highly reduced, bract-like leaves at the lower nodes; involucre turbinate, 1-1.5 mm long, 0.6-1 mm wide, villous, the 4 oblong lobes dividing the tube nearly to the base; flowers white to red, 1-1.5 mm long, glabrous or hispidulous without, the tepals slightly dimorphic, those of the outer whorl obcordate, those of the inner whorl narrower; achenes light brown, 1 mm long.---Infrequent to rare on sandy to gravelly soil in sw. Utah; central and se. Nev. Jun-Aug.

An Arizona species which might be found in southern Utah is *Eriogonum darrovii* Kearney. It differs from the above two species in having the tepals of the outer whorl fan-shaped and hooded, and being sericeous and leafy throughout. This species occurs just south of the Utah line in Coconino and Mojave cos. south of Fredonia, and would be expected to occur in sandy soil in the pinyon-juniper woodlands of Kane Co.

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The following list of names is supplied to all entities mentioned in this treatment. Names in **bold face type** are acceptable names; those in *italics* are synonyms. The number refers to the species under which the taxon is mentioned or discussed.

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